FOUNDRY TRADE JOURNAL

Established 1902

Vol. 96 Thursday, January 14, 1954 No. 1950

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PUBLISHED WEEKLY: Single Copy, 9d. By Post 11d. Annual Subscription, Home 40s. Abroad 45s. (Prepaid).

49 Wellington Street, London, W.C.2. 'Phone: Temple Bar 3951 (Private Branch Exchange) Grams: "Zacatecas, Rand, London"

"Job Performance"

The object of systematic training in subjects of an academic or technical character is to bestow upon the student ability to follow a profession or trade or to endow him with a culture and a way of thinking which should be a great asset in his dealings with his fellow men. In recent times, much has been written and spoken upon education and training for management. The most recent contribution is a report on this subject by the Federation of British Industries.* This is very interesting because, if we interpret the text correctly it places "training for management" on a different basis from other types and more or less contradicts our opening statement. The following quotation is important, as it says: "It is of great help if the senior executives make it known throughout all levels of staff that the prospects of promotion in the organization are determined by 'job performance,' and not by academic qualifications or record of attendance at training courses." Here is set forth the basic truth that it is "job performance" either in one's own or somebody else's concern which is now, always was, and unquestionably will always be the governing factor in promotion to positions of importance.

Special courses of training for management may have potentialities for instilling into students some underlying principles of supervision, but as managers have no set list of duties or authorities—they may be wide or circumscribed—any syllabus laid down must be of such a general character as to be almost platitudinous. To be realistic, when a new manager is wanted, the promotion of an assistant is given first consideration, because he is best known to the Board or owner and, moreover, is familiar with the organization. Many concerns are insufficiently large to allow each manager an assistant, so recourse is had to outside help. It is taken into consideration that such a man may possess a wider outlook than those internally available, but in every case the final decision will be made on "job performance" within or beyond the confines of any one works.

The report cited is well balanced. It shows no particular enthusiasm for training for management, but recognizing that it is a relatively new phase of industrial educational activity, postulates that it is a subject warranting careful thought. We are aware of several cases where young men are needed for training—but in the actual works—to assume control over the concern as managing directors, but it is deemed necessary that they possess a good record at an early age. We always regard it desirable to take stock and examine the work of current facilities before instituting new ones. Thus, so far as the foundry industry is concerned, they appear to be quite adequate for the training of craftsmen, foremen, technicians, and even the highest executives, but at the moment there is perhaps a shortage of the academic scientist. Yet for this type of individual there is but a limited demand. The promoters of the notion of training for management seem to desire to alter the adage that "there is always room at top" by filling the gap, yet, despite all efforts, this basic truth will still persist. The highest posts in industry will still be filled by those having an outstanding record in their chosen fields —or, as the report aptly puts it—on "job performance."

*Price 2s., from the Federation at 21, Tothill St., London, S.W.1.

Famous English Fireback of 1548

By H. R. Schubert

The cast-iron fireback shown in the illustration represents the arms of King Edward VI (1547-1553) in a quartered shield (three fleur-de-lys, three leopards) surmounted by a crown and with a griffin and a greyhound as supporters. The date at the base (1548) makes it the earliest dated fireback in England.

The fireback appears to have been much favoured in the sixteenth century. A specimen is at Ockwells, in Berkshire, and a fragment at Anne of Cleves' house at Lewes, in Sussex. The fireback was apparently in great favour on the Continent also, since several specimens are preserved in Belgian and German museums, such as the *Musée Archéologique* at Namur, the *Musée Curtius* at Liége, and in the collection of firebacks of the *Verein Deutscher Eisenhüttenleute* at Düsseldorf, the last-named being acquired from Grand Hallieux, near Stavelot in Belgium. Another found at Libramont in Belgium, and now preserved at the *Musée Archéologique* at Arlon, only has one slight difference from those noted. The outlines lead from the sides directly into the top arch without any break.

* Reprinted by courtesy from the *Journal* of the Iron and Steel Institute. Dr. Schubert is historical investigator to the Institute.

International Foundry Congress

The 1954 Congress is to be held in Florence from September 19 to 26 next. Registration should be made through the Institute of British Foundrymen. The registration fee for members is 8,000 lire, for the ladies 4,000. Papers for presentation should be submitted before April 30. In connection with the congress, exhibitions of foundry plant, castings—antique and modern—and art castings are to be held.

Correspondence

HISTORICAL INFORMATION SOUGHT

To the Editor of the FOUNDRY TRADE JOURNAL.

SIR,—As a constant reader of your very excellent magazine, it occurs to me that possibly you may be of some help to us in gathering information for our centennial celebration.

This company was originally founded here in Rockford, Illinois, U.S.A., by my great grandfather, Duncan Forbes, and his son, Alexander D. Forbes. The father and son came to this country from Deanston, Scotland, and the father had been a foundryman at the nearby town of Doune. I do not know whether a famine, a religious persecution, or the prospect of a bright future in the "new world" was the stimulus that caused them to come here and select a foundry location nearly one thousand miles from the Atlantic.

In any event, they stopped a few months in central New York state and reached Rockford in the early Spring of 1854. Actually, they arrived the year after railroad facilities from Chicago were available to them. The country had just recently been cleared of the Indian tribes and I imagine living accommodation was still most primitive.

When my wife and I were married in 1921, we motored through both Doune and Deanston. There was no hope, of course, of meeting anyone who knew either of my grandparents. However, it might be possible that records would give some clue as to the name of the foundry for which my grandfather worked in Doune, with, possibly, some information as to its history. We are, naturally, very anxious to include as much early information as we can in our write-up of the first one hundred years of our history. Few companies have stayed in the ownership of a single family for as many years as ours.

Hoping you can give us some information or can suggest someone who could do so.—I am, etc.,

DUNCAN P. FORBES,
Chairman, Gunite Foundries Corporation.

[The Editor will be pleased to forward to Mr. Forbes any information readers may possess.]

Coltness Foundry to Close

Hopes that the foundries at Coltness Works, Newmains, would be kept in production were shattered recently by an announcement that negotiations betweeen G. & J. Weir, Limited, and George Elsie & Company, Limited, Durham, for the transfer of the works to the latter firm had "completely broken down." Closure of the foundries will now take place as scheduled. G. & J. Weir, Limited, are keeping the engineering shop, smithy and the joiners' shop in operation; they provide employment for about 100 men in the making of pit hutches and man-riding carriages for the National Coal Board.

Change of address—a correction.—In the paragraph printed last week about a changed address of British Electro Metallurgical Company, Limited, it should have been made clear that it is the London office only which has removed (to 103, Mount Street, London, W.1). The head office is, of course, still at Wincobank, Sheffield. Apologies are tendered to the firm and all who may have been confused by the omission.

Control in an Investment Foundry*

By D. F. B. Tedds, F.I.M.

Ten years ago saw the introduction into industry of the lost-wax technique of casting. Since that time, steady progress has been made with the development of the process and the manufacture of specialized equipment, so that to-day, a number of well-equipped and -organized precision investment foundries are working successfully under production conditions. This Paper describes the layout and operation of one of these—that attached to Bristol Aeroplane Company Limited. Particularly, details are given of the process-control methods which have been introduced to change the conception of the job from a semi-laboratory method to a fully-integrated high-production unit.

The precision investment foundry with which the author is associated at Bristol covers an area of 40,000 sq. ft. and from Fig. 1 will be seen to be built along modern lines. This, coupled with forced-air circulation and a modern colour scheme for both buildings and plant gives an ideal foundry set-up which is conducive to the high class of work expected from this process. The repetition production of castings by the precision-investment process presents numerous problems to the foundryman, and it is only by strict control exercised at all stages that ultimate success is obtained. There are ten major stages of the process involving some 30 operations; from this, it will be gathered that production operations must be carefully worked out, supervisory control must be rigid and technical control must be exercised on all materials entering and in use in the foundry.

FIG. 1.—*Exterior view of Bristol Aeroplane Company's precision investment foundry, showing the cyclone separators.*

Process Development

Prior to passing to the production departments, each new component arriving in the foundry is initially investigated in a "development" section which is responsible for developing methods for the production of sound castings. A part of each department of the foundry, *e.g.*, wax injection, wax assembly, moulding, casting, etc., is set aside for development work only, each having for the purpose

* Paper presented to the East Midlands branch of the Institute of British Foundrymen.

(A) CONDITIONS FOR INJECTION OF WAX PATTERN.

Injection machine	*Vertical production*
Type of wax	*A71*
Air line pressure	*18 p.s.i.*
Injection pressure	*18 p.s.i.*
Injection rate	*2*
Nozzle aperture	—
Wax temperature	*72–77 deg. C.*
Die temperature	*30 deg. C.*
Die angle	—
Wax setting time	*2 mins.*
Special conditions and remarks	—
WAX RUNNER	
Identification No.	*T215015* / *B186443*
Modifications	—
Remarks	—

(B) PRIMARY INVESTMENT PROCESSING PROCEDURE

The pattern is dipped in the refractory coating and not sprayed. A refractory core is used to avoid breakdown of the bolt hole.

SECONDARY INVESTMENT	
Type of mix	*Normal*
Mould strength	—
Special operations	—
CONDITIONS FOR CASTING.	
Weight of metal	*6½ lb.*
Metal casting temperature	*1,440-1,460 deg. C.*
Mould temperature	*1,000 deg. C.*
Duration of mould cooling	—
Air pressure	*7 p.s.i.*
Additions	—
Direction of pouring	—
Special conditions	—

FIG. 2.—*Development control charts (A) and (B) for the exhaust elbow component shown. The photographic record bears also the legend:—*

Part No. *F.B.* 196061. Foundry identification: *AD*; Material: *B.A.C.* 230; Mould dimensions: 9 *in.* and No. per mould: *Two.*

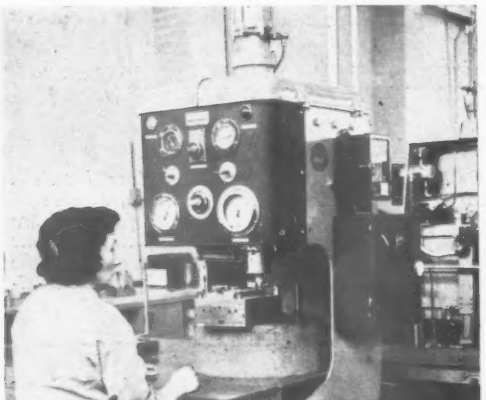


FIG. 4 (*above*).—*Assembly of the wax patterns with the aid of an electrically-heated spatula.*

FIG. 3 (*left*).—*Injection of the wax pattern, using a fully-automatic machine.*

a set of equipment identical with that devoted to production. Having achieved the desired results with sample batches of castings, the details are recorded on control charts (Fig. 2). These charts are then deposited with the supervisory staff of the appropriate department *e.g.*, wax-pattern production with the wax room; casting production with the casting section, etc., and are available for immediate use once production is scheduled.

PRODUCTION METHODS

Successful production by this process is only possible by the elimination of variables. Thus, considerable attention has had to be given to the design of machines and ancillary equipment in order to make conditions reproducible. Those operations which cannot be so conducted and thus rely on human effort must be adequately controlled by supervisory staff using control charts and other aids.

FIG. 5.—*General view of the wax - pattern department, showing the pendulum-type continuous conveyors.*

Wax-pattern Production

The first essential in wax-pattern production is, naturally, a metal die into which the wax is injected, and here it is sufficient to say that these dies are cast, using a plaster and low-melting-point-metal technique, or machined by conventional tool-room methods. Dies made by the latter method are more accurate, stand up better to shop use and are adopted wherever possible.

The actual production of the

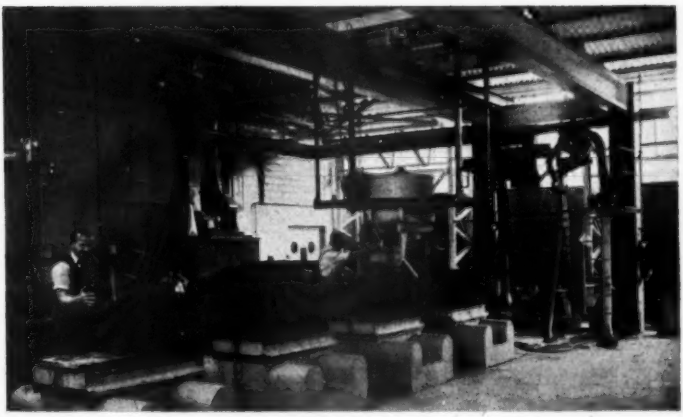


FIG. 6.—*Patterns and flasks being assembled on magnetic plates attached to electro-magnetic vibrators, in preparation for investment.*

wax patterns is carried out on an injection machine (Fig. 3) designed to be fully automatic and give reproducible conditions as originally suggested in a previous article.[1] With this type of machine, the operator depresses a button-type control switch and the machine completes a cycle of operations, identical to that previously carried out.

Having produced the wax pattern, it is delivered to an inspection station when it is given a visual, and if necessary, a dimensional check. It is then conveyed to the wax-assembly section where it is built up into casting formation by means of electrically-heated spatulas. Spatulas of various shapes are employed, depending on the type of component; they are made from Nimonic-75 sheet and heated by a current of 12 amps. at 2v (see Fig. 4). Wax runners, feeders, etc., are gravity poured into low-melting-point-metal dies and after assembly, waxed metal plates are attached to the base of the runner —the reason for which will be later explained.

The assembled patterns are then visually inspected before hanging the assembly on a travelling conveyor, which takes it to the primary coating station (Fig. 5). Here the patterns are washed in a wetting agent, followed by a water swill and air drying, this operation preparing the surface of the wax for the application of the primary coating.

The sequence of operations in the building-up of the primary coating on the wax assembly is peculiar to the process developed and applied at Bristol[2]. The primary coating consists of alumina cement sprayed over the surface of the wax, and the waxed steel plate, by means of a pressure spray-gun. Further coatings are applied; drying cycles are all controlled by means of travelling conveyors set at a pre-determined speed. This method produces coatings approximately 1/16 in. thick which ultimately forms the facing on the mould cavity.

Mould Making

The wax assemblies are next conveyed by means

FIG. 7.—*Loading moulds on a stillage into a low-temperature de-waxing oven;* 18 *hrs. at* 140 *deg. C. is required.*

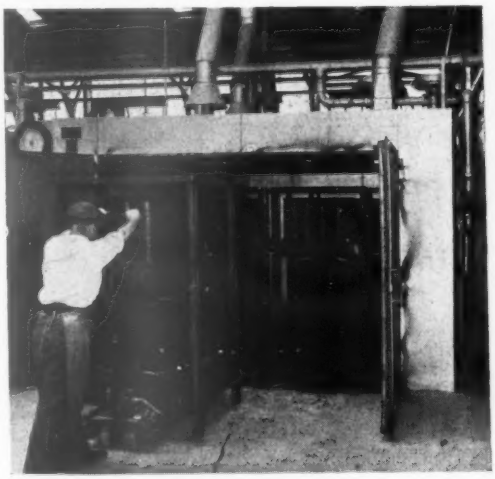
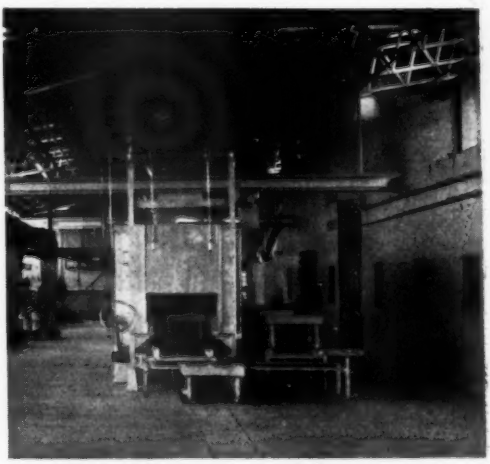


FIG. 8.—*End view of one of the high-temperature firing ovens, through which moulds are traversed at* 3 *ft. per hour; the firing chamber being* 10 *ft. long.*



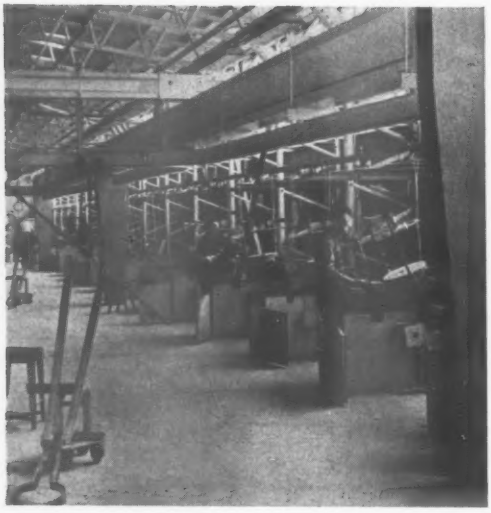


FIG. 9.—*Metal melting and casting section, equipped with six 15-lb. capacity indirect-arc furnaces.*

FIG. 11 (*right*).—*Pouring by inversion of the assembly. Air pressure is applied at 10 lb. per sq. in. to the furnace body.*

FIG. 10.—*Mould clamped to the top of the furnace body ready for pouring by inversion.*

of an overhead system from the wax room to the moulding section. Here they are removed from the track, the handle is unscrewed and the unit placed on electro-magnetic chucks attached to electro-magnetic vibrators (Fig. 6). The moulding flask, previously cleaned and dipped into molten wax to form a coating on the inner surface, is then placed over the assembly and held in position by the magnetic chuck. The investment mixture is weighed and conveyed by means of a hoist to an intensive mixer, where an automatic switch operated by the hoist adds the correct amount of water for mixing. The mixer then travels along an overhead track and the operator is able to discharge the investment simultaneously into each pair of moulding flasks. Gauges, suspended into the mould, indicate to the operator when the correct amount of investment has been charged.

The electro-magnetic vibrators, operating at a frequency of 6000 c.p.m. and an amplitude of 0.001 in. then compact the investment around the patterns. The time to complete this operation depends upon the size of mould, but averages about 20 mins. By switching off the electro-magnetic chucks, the moulds are easily removed from the vibrating tables and are then left to air dry for from 12 to 18 hours. They are then placed in the forced-air low-temperature drying oven where de-waxing is carried out for 18 hours at 140 deg., C. (Fig. 7). On removing the moulds from the oven, the metal flasks are easily pressed off and returned to the cleaning station prior to re-use on the moulding section. The de-waxed moulds are next loaded on to conveyor trolleys ready for passing through the high-temperature firing oven (Fig. 8). This oven is

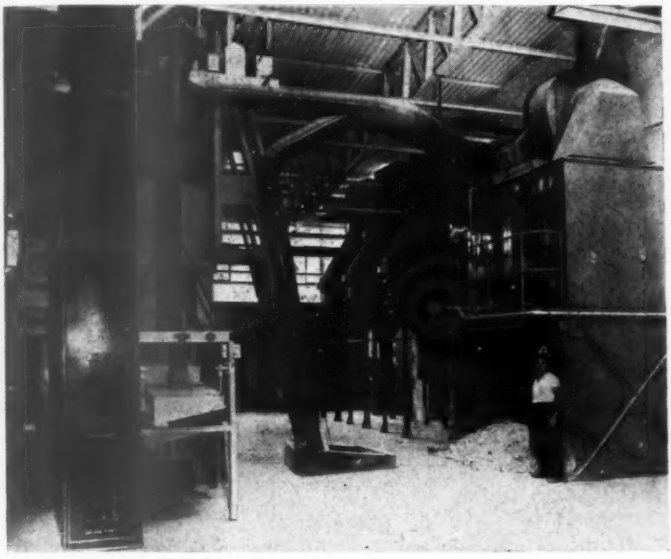


FIG. 12.—*Knock-out room where castings are removed from their moulds and investment material is reclaimed.*

24 ft. long, with a firing chamber 3 ft. wide by 2 ft. 6 in. high by 10 ft. long. Moulds travel through this chamber at a rate of 3 ft. every hour, their temperature gradually increasing up to 1000 deg. C. over a period of 6 hours. During this period, any moisture and wax remaining in the mould after the low-temperature drying is removed, leaving the mould in a suitable state to receive molten metal.

Casting Production

The casting or furnace section consists of six 15-lb. capacity indirect-arc furnaces serviced by overhead mono-rail from each high-temperature oven (Fig. 9). The furnaces consist of a steel carcase, split through the centre-line, each half being rammed with an outer refractory lining of sillimanite and an inner lining of alumina, which latter acts as the crucible. The two halves are bolted together and the lining is dried and fused *in situ*. Each furnace is powered from a 24 kva transformer through a variable reactance box, thus giving a measure of control on the melting rate. Molten metal temperatures are taken using a platinum/platinum - rhodium thermocouple contained in a silica sheath, the casting temperatures being controlled to ± 10 deg. C. The moulds are taken from the high-temperature oven, clamped to the furnace (Fig. 10) and inverted through 180 deg. A cam, operating an air valve, allows air at 10 lbs. per sq. in. pressure to enter the crucible and force the metal into the mould (Fig. 11). A quick-release clamp, operated by the furnaceman, then releases the mould whilst the furnace is in the inverted position, the mould then being taken to its cooling station by means of jockey-tongs.

After cooling to room temperature, the moulds are taken to the knock-out room (Fig. 12) where the castings are removed from the moulds, and any trapped investment is removed from the castings by means of pneumatic hammers, etc. The "used" investment material is re-milled in a roller-type mixer where it is crushed prior to passing over an 80-mesh nylon screen attached to a vibratory sieving machine (Fig. 13). The reclaimed coarse material is returned *via* an elevator hopper to the moulding section, where it is used in a 50/50 ratio with new material.

The castings are conveyed by means of roller

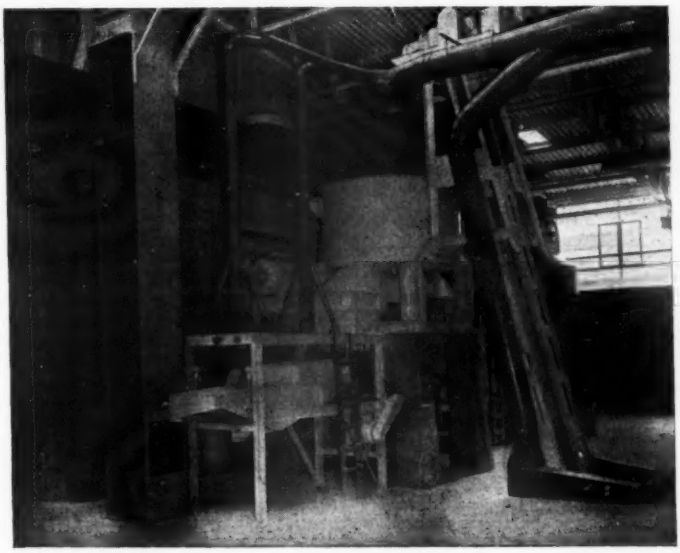


FIG. 13.—*Investment reclamation unit, comprising a roller-type crusher and an 80-mesh nylon screen embodied in a vibratory sieving machine.*

FIG. 14.—*Battery of high-speed abrasive cutting-off machines for removing runners and risers.*

FIG. 16.—*Section of the inspection department set aside for the hot-oil-and-chalk test for unsoundness.*

track to the fettling section. Here they are first shot-blasted to remove all traces of refractory investment; the runners, feeders, etc., are cut off by means of a high-speed abrasive wheel (Fig. 14); the jobs are sampled for laboratory analysis and subjected to a visual inspection. Castings released by the laboratory are passed for the fettling operation which is carried out by means of portable electrical or pneumatic tools (Fig. 15). After satisfactory visual check, all castings are submitted to an examination by X-ray and the hot-oil-and-chalk-test (Fig. 16). A final dimensional check is then conducted prior to releasing the castings from the foundry department.

REFERENCES
[1] Proc. Inst. of Brit. Foundrymen, 1952, Vol. XLV.
[2] British Patent No. 672535.

(To be continued)

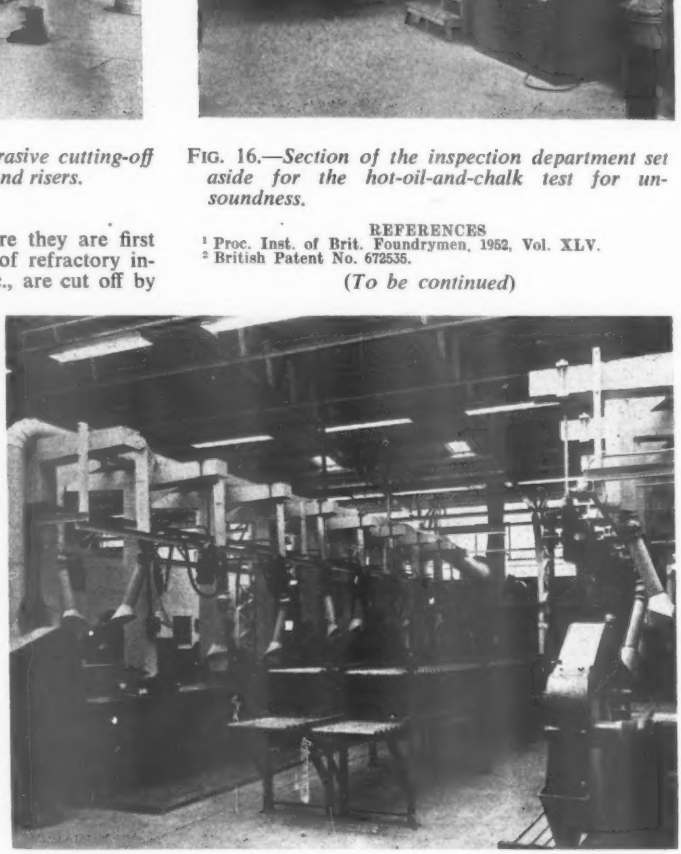


FIG. 15.—*General view of the fettling shop devoted to precision investment castings at the Bristol Aeroplane Company's works.*

IN WALLACE FOUNDRY, Dundee, is a room which probably contains one of the world's largest collections of textile photographs. The claim is staked by 77-years-old Mr. Laurence S. Gorrie, who has built up the collection since joining Urquhart Lindsay & Robertson Orchar, Limited, in 1910, as the firm's photographer. His duties embrace filming or photographing machinery during the various stages of production to locate faults in design and also for distribution to customers.

New Year Honours

Awards to many people associated with the foundry, iron and steel, and allied industries were announced in the New Year Honours List. Details of some of the awards, together with biographical notes on the principal recipients, are given below:—

VISCOUNT

LORD LEATHERS, who was Secretary of State for Co-ordination of Transport, Fuel and Power from 1951 until he resigned last September, held office as Minister of War Transport from 1941 to 1945. His working life has been associated with the coal and shipping trades, and before he joined the Government he was chairman of Wm. Cory & Son, Limited, and a director of the P & O Steam Navigation Company, Limited, the Westminster Bank, the Tunnel Portland Cement Company, Limited, the Guardian Assurance Company, the Union Corporation, and many other companies.

BARON

MR. RICHARD KIDSTON LAW, for political and public services. He was Minister of State, Foreign Office, 1943-45, and Minister of Education, 1945. Mr. Law, who is Conservative M.P. for Haltemprice, is chairman of Bromilow & Edwards, Limited, manufacturers of hydraulic tipping gear, etc., of Bolton, and of Edwards Bros. (Tippers), Limited, Bolton, and a director of Parnall (Yate), Limited, domestic electrical and mechanical engineers, of Bristol, Ascot Water Heaters, Limited, Autolifts & Engineering Company, Limited, and other companies.

BARONET

COL. SIR JOSEPH NALL, for political and public services. Sir Joseph, who was formerly M.P. for the Hulme division of Manchester, has served on the boards of many companies, including the Manchester Ship Canal Company, and Trafford Park Estates, Limited, of which he is chairman. He was president of the Institute of Transport, 1925-26.

KNIGHTS BACHELOR

MR. DONALD FORSYTH ANDERSON, chairman of the Shipping Federation and president of the Chamber of Shipping of the United Kingdom.

MR. GEORGE FOSTER EARLE, chairman and joint managing director of Associated Portland Cement Manufacturers, Limited, and British Portland Cement Manufacturers, Limited.

MR. JOHN BLUMENFELD ELLIOT, lately chairman of the Railway Executive and now chairman of London Transport Executive. He is president of the Institute of Transport.

COL. WILLIAM CHARLES FENTON, for political and public services in Spen Valley (Yorks). He is managing director of British Belting & Asbestos, Limited, Cleckheaton.

MR. ROLAND JENNINGS, for political and public services. Mr. Jennings, who is Conservative-Liberal M.P. for Hallam, has an intimate knowledge of industry. In the House of Commons he frequently speaks on behalf of the steel industry. By profession he is a chartered accountant and he is a director of several companies.

MR. ERNEST HARRY LEVER, chairman and chief executive of the Steel Company of Wales, Limited, and Richard Thomas & Baldwins, Limited. Mr. Lever, who is chairman of the Welsh Plate and Sheet Manufacturers' Association, has served also as chairman of Monks, Hall & Company, Limited, Tinplate Conference (1925), Limited, and the Whitehead Thomas Bar & Strip Company, Limited, and as a director of many companies, including Guest Keen Baldwins Iron & Steel Company, Limited. Born in 1890, he started his career with the Prudential Assurance Company in 1907, rising to the position of joint secretary of the company, which he held from 1931 to 1940.

MR. OLIVER LYLE, for services in promoting fuel efficiency. He is a director of Tate & Lyle, Limited, and other companies.

MR. EDWARD TALBOT PARIS, chief scientific adviser, Home Office, since 1948. After serving as deputy director of scientific research at the War Office, he transferred to the Ministry of Supply in 1939, and became controller of physical research in 1941 and controller of physical research and signals development in the following year.

MR. WALTER CHARLES PUCKEY, lately Deputy Controller of Supplies (Aircraft Production), Ministry of Supply. Before being invited to joint the Ministry in a temporary capacity, he was a director and general works manager of Hoover, Limited. He is also a director of British Tabulating Machine Company, Limited, and president of the Institution of Production Engineers.

MR. WILLIAM GORDON RADLEY, engineer-in-chief, G.P.O.

BRIG. ARTHUR MAXWELL RAMSDEN, for political and public services in Yorkshire. A director of the David Brown Corporation, Limited, tractor and farm implement manufacturers, of Meltham, Huddersfield, he is also on the board of Hopkinsons, Limited, the Huddersfield engineers and foundrymen, and other companies.

ORDER OF THE BATH
Civil Division
K.C.B.

SIR JAMES REGINALD CARROLL HELMORE, Permanent Secretary, Ministry of Supply.

MR. VICTOR GEORGE SHEPHEARD, Director of Naval Construction, Admiralty.

C.B.

MR. M. P. MURRAY, Under-secretary, Ministry of Fuel and Power.

ORDER OF ST. MICHAEL AND ST. GEORGE
K.C.M.G.

MR. ROBERT LOWE HALL, economic adviser to H.M. Government. He served with the Ministry of Supply from 1939 to 1946 and was a member of the British Raw Materials Mission to Washington, 1942-44.

C.M.G.

MR. N. C. ROBERTSON, director general of electronics production, Ministry of Supply.

ORDER OF THE BRITISH EMPIRE
Civil Division
K.B.E.

MR. LEONARD PERCY LORD, chairman and managing director of the British Motor Corporation, Limited. He is also chairman and managing director of the Austin Motor Company, Limited, and its subsidiaries and of Morris Motors, Limited, and its subsidiaries.

CMDR. SETON STEUART CRICHTON MITCHELL, R.N. (retd.), controller of guided weapons and electronics, Ministry of Supply.

C.B.E.

DR. D. A. ALLAN, director of the Royal Scottish Museum, Edinburgh, assistant to the Regius Professor of Geology, Edinburgh, 1921-24, and Lecturer in Geology at Armstrong College, Durham University, 1925-29; MR. S. F. BURMAN, managing director of Burman & Sons, Limited, a director of Imperial Chemical Industries, Limited, Joseph Lucas (Industries), Limited, W. & T. Avery, Limited, Henry Pooley & Son, Limited, manufacturers of weighing machinery, of Birmingham, and Serck Radiators, Limited; MR. G. T. BUSSEY, assistant secretary, Ministry of Fuel and Power; MR. W. K. DAVEY, chairman, London Metal Exchange; MR. ST. J. DE H. ELSTUB, director, Metals Division, Imperial Chemical Industries, Limited; MR. H. EYLES, lately secretary, Birmingham Chamber of Commerce; MR. W. G. FERGUSSON, assistant secretary, Ministry of Materials; DR. T. FERGUSON, Professor of Public Health at Glasgow University; MR. W. K. HUTCHISON, chairman, South Eastern Gas Board.

MR. B. P. INGAMELLS, director Merchant Shipping and Repairs, Admiralty; MR. J. MAXWELL, general manager of Thos. Cook & Son, Limited, travel agents, and chairman of the London committee of the Scottish Council (Development and Industry); MR. A. G. B. OWEN, chairman and president of Darlaston Savings Committee, who is chairman and joint managing director of Rubery, Owen & Company, Limited; CAPT. G. VILLAR, general manager, Southampton, and a director of John I. Thornycroft & Company, Limited; MR. P. O. WILLIAMS, a member of the Development Areas Advisory Committee, an adviser to the U.K. Government delegation at international tin conferences for several years; MR. S. W. WOOLDRIDGE, Professor of Geology, London University; MR. M. D. N. WYATT, chairman of Airwork, Limited.

O.B.E.

MR. J. CHAMBERLAIN, chief engineer, Aiton & Company, Limited, ironfounders, etc., of Derby; MR. J. COWLES, principal, Ministry of Materials; MR. R. K. CUSHING, principal scientific officer, Ministry of Supply; MR. A. V. DALZELL, secretary-director, Federated Quarry Owners of Great Britain; MR. T. ECCLES, vice-chairman, North Western Regional Board for Industry.

MR. R. B. HOVEY, chairman, Zan, Limited, aluminium founders, etc., Sandbach (Ches.); MR. J. H. MCCUAIG, shipyard manager, Harland & Wolff, Limited, Belfast; MR. T. W. MCCULLOUGH, lately Superintending Inspector of Factories in Scotland, now Deputy Chief Inspector of Factories, Ministry of Labour and National Service; MR. A. MARSH, director, National Smoke Abatement Society; MR. A. S. MITSON, assistant director, electronics production, Ministry of Supply; MR. P. E. MONTAGNON, senior principal scientific officer, Ministry of Fuel and Power; MR. W. C. MUIRHEED, special director, English Steel Corporation, Limited, Sheffield.

MR. A. J. NICHOLAS, a director and general manager, South Wales Switchegear, Limited, and Neptune Brass & Aluminium Company, Limited; MR. W. H. PURDIE, engineering director, William Doxford & Sons, Limited, Sunderland, and a director of National Galvanizers, Limited, Sunderland.

M.B.E.

MR. J. S. BALL, head of the design and development department, Henry Simon, Limited; MR. W. L. BARKER, vice-chairman, Wearside District Advisory Committee, Northern Regional Board for Industry, and for 17 years secretary of the Wearside District Committee of the Confederation of Shipbuilding and Engineering Unions; MR. T. W. BLAKE, welfare officer, Westwood Works, Baker Perkins, Limited, engineers and foundrymen, of Peterborough; MR. J. L. BUCHAN, a director and manager, electrical department, William Broady & Son, Limited, Hull; MR. L. T. DAWES, commercial manager, secretary, and a director, Beyer Peacock & Company, Limited, locomotive engineers, etc., of Manchester; MR. A. W. DUNLOP, engineering superintendent, Short Bros. & Harland, Limited, Belfast.

MR. H. F. W. GOLDING, chief inspector, Northern Aluminium Company, Limited, Banbury (Oxon); MR. F. H. GREEN, senior executive officer, Ministry of Supply; MR. W. H. F. GRIFFITHS, chief engineer, H. W. Sullivan, Limited; MR. R. J. HAWLEY, land and estate agent, Staveley Iron & Chemical Company, Ltd.; MR. W. C. JOHNSON, chief chemist, Baird & Tatlock (London), Limited; MR. P. S. KEMSLEY, works superintendent, Joseph Lucas, Limited, Burnley; MR. W. R. J. LEACH, higher executive officer, Ministry of Supply; MR. C. MCKAY, head foreman shipwright, John Brown & Company, Limited, Clydebank.

MR. C. E. MILES, manager, Hampton Launch Works, Limited, MR. J. B. MILLS, chief designer, Fodens, Limited, Sandbach (Ches.); MR. J. M. MONTAGUE, senior executive officer, Ministry of Materials; MR. E. A. MUSTO, senior executive officer, Ministry of Fuel and Power; MR. G. H. RIPPON, technical director, Maun Industries, Limited; MR. J. RIX, production manager, Vosper, Limited, shipbuilders, of Portsmouth; MR. J. D. D. SHAW, managing director, James Kilpatrick & Son, Limited; electrical engineers; MR. P. F. T. SNOW, senior assistant, Ministry of Materials; MR. D. R. TODD, naval architect, John I. Thornycroft & Company, Limited, Southampton; MR. A. F. TOSH, a director and works manager, Summerson's Foundries, Limited, Darlington, and a member of the Technical Committee of the British Steel Founders' Association; MISS M. B. WATERS, higher executive officer, Department of Scientific and Industrial Research; MR. F. W. A. WATERSON, senior contract officer, Admiralty; MISS C. E. WILLIAMS, private secretary to the vice-president, Shipbuilding Employers' Federation; MR. J. WILSON, general works manager, Blaw-Knox, Limited, London, S.W.3.

ROYAL VICTORIAN ORDER
K.C.V.O.

DR. JAMES MCFADYEN MCNEILL, F.R.S., deputy chairman and managing director of John Brown & Company, Limited, Clydebank, and a director of Costain-John Brown, Limited, and John Brown & Thos. Firth (Overseas), Limited. He is vice-president of the Institute of Naval Architects. Dr. NcNeill, who was president of the Institution of Engineers and Shipbuilders in Scotland from 1947 to 1949, is a governor of the Royal Technical College, Glasgow. He was the shipbuilding representative at the International Conference on Safety of Life at Sea in 1948.

FOREIGN OFFICE LIST
Order of the British Empire (Civil Division)
C.B.E.

MR. W. HARRIS-BURLAND, lately British chairman, Combined Steel Group, Control Commission for Germany (British Element).

O.B.E.

MR. W. LANGFORD, manager for France of Associated Machine Tool Makers, Limited; MR. A. P. RUDDY, general manager of the High Speed Alloys Mining Company, Limited, Burma.

BRITISH EMPIRE MEDAL

MR. G. A. BURROWS, senior foreman, Bruntons (Musselburgh), Limited, steel rollers and wire-rope manufacturers, etc.; MR. S. COGMAN, production manager, wire netting department, Boulton & Paul, Limited, Norwich; MR. J. E. COLLEY, turner and borer, Lancashire Dynamo & Crypto, Limited, Manchester; MR. T. A. COLLEY, ladle carriage driver, Park Gate Iron & Steel Company, Limited, Rotherham.

MR. T. FARNAN, safety supervisor, Bartram & Sons, Limited, shipbuilders, of Sunderland; MR. F. L. GEORGE, chargehand, J. & H. McLaren, Limited, engine builders, etc., of Staines (Middx); MR. R. GREEN, lately foreman, Hilger & Watts, Limited, manufacturers of scientific instruments, of London, S.E.5; MR. G. H. GREEN, toolroom foreman, A. Kershaw & Sons, precision engineers, etc., of Leeds; MR. W. G. HAMMOND, platers' marker-off, Vickers-Armstrongs, Limited, Crayford (Kent); MR. E. C. HARRIS, furnaceman, Capper Pass & Son, Limited, Bristol.

MR. T. W. PAINTER, mill superintendent, Swansea, Imperial Chemical Industries, Limited (Metals Division); MR. D. B. RICHARDS, under foreman, Girling, Limited, manufacturers of brakes, etc., of Cwmbran (Mon); MR. E. R. SELLARS, foreman electrician, Ransome & Marles Bearing Company, Limited, Newark-on-Trent.

MR. R. A. SHEPHERD, template maker, Cravens Railway Carriage & Wagon Company, Limited, Sheffield; MR. W. H. SMALLEY, propeller moulder, Harper, Phillips & Company, Limited, Grimsby; MR. J. F. TYRER, chargehand fitter, Vulcan Foundry, Limited, Newton-le-Willows (Lancs); MR. R. WILLIAMS, planning engineer, Newton Chambers & Company, Limited, Thorncliffe, near Sheffield; MR. W. WYATT, chargehand toolmaker, Park Bros., Limited, Blackburn.

Federation's President-elect

The Iron & Steel Federation's new president-elect, Mr. A. G. Stewart, is the grandson of Mr. Andrew Stewart, and the son of Mr. John Graham Stewart, who was chairman of Stewarts and Lloyds, Limited, from 1901 until 1925. Mr. Stewart entered the company in 1924, beginning work at Clydesdale, and during the next few years saw service at a number of works and offices in this country, as well as visiting South America, the United States, and Australia. This period of apprenticeship ended in 1931 when he was appointed a director of the company, and at the end of the same year managing director.

In 1941, Mr. Stewart became assistant general managing director in charge of tube and shell production. The deputy chairmanship followed in 1943, and on the death of Sir Alan Macdiarmid in August, 1945, he was appointed chairman and general managing director of Stewarts and Lloyds. He was then 44. In addition, he is chairman of the Stanton Ironworks Company, Limited, and either chairman or a director of many of the company's associated firms and subsidiaries.

Mr. Stewart, whose home is at Houston, is a member of the Renfrewshire Hunt, while shooting and golf are also among his favourite pastimes.

EXTENDED INSURANCE COVER against pneumoconiosis is provided by regulations made under the National Insurance (Industrial Injuries) Acts by the Minister of Pensions and National Insurance, which came into operation on January 11.

Dorman Long's Peak Ingot Output

Sir Ellis Hunter, who has now relinquished his duties as president of the British Iron and Steel Federation, reveals in a foreword to a finely illustrated brochure on the operations of Dorman, Long & Company, Limited, of which he is chairman and managing director, that the company's ingot output in the year ended October 3 last was 1,759,079 tons—almost exactly one tenth of the national production. "This creditable result," he says, "was not affected by the starting of the Lackenby open-hearth steelworks, but reflects the improvements effected at other works in recent years." Regarding the Lackenby plant, it is stated that production began early in September. There are now four 360-ton tilting furnaces and two 600-ton active makers in production, and a fifth furnace is expected to be in commission early in the New Year. The tilting furnaces are said to be the largest operating in the Commonwealth.

With the Lackenby steel plant completed, the company has now embarked upon the third and by far the biggest stage of its development programme, which includes the building of a new coke-oven plant at the Cleveland works designed nearly to double the output of crude benzole and crude tar. From Cleveland this crude material will be sent for refining to the company's central refinery plant at Port Clarence, where £875,000 is to be spent on additional plant. Already operating at Port Clarence is the new benzole plant designed primarily to make large quantities of pure benzole used by nylon manufacturers and also for the production of styrene, a thermoplastic with special qualities.

Wm. Aske's Golden Jubilee

Last week, the well-known firm of Wm. Aske & Company, Limited, of Halifax, celebrated the 50th anniversary of its establishment. It was formed by the late Mr. Wm. Aske in small premises in Powell Street as an oil, colour and factory furnishing business. In 1909, in association with the late Mr. Ellis Whittacker, experiments were carried out which resulted in the launching of the "Baltiseed" line of core oils. Their success was immediate and larger premises were taken at West Parade. By 1939, these were found insufficiently large and there was a second removal to the present address at Waterside.

In the meantime, Mr. Wm. E. Aske, the only son of the founder, took control and development of the firm then concentrated almost entirely on foundry supplies. With other manufacturers of core oils, Mr. Aske became very active in the work of the Foundry Trades Equipment and Supplies Association, and in 1951 and 1952 was elected its president, and, moreover, made an outstanding success of his year of office, during a period when its activities were expanding. He especially interested himself in the work of the Joint Standing Committee on Conditions in Ironfoundries. Mr. Aske has held membership in the Institute of British Foundrymen since 1936. It is certain that the congratulations extended by the staff of this JOURNAL to the firm on the occasion of its golden jubilee will be re-echoed by many in the foundry industry.

BRITISH INDUSTRY should look forward to the future not with doubts or fears, but with gratitude and pride that it has been granted the opportunity once more to prove its prowess, said Lord Rochdale, president of the National Union of Manufacturers, in a New Year message to members.

Works Surgery Report

The following extracts from the annual report* of the nurse in charge of a foundry works surgery show how the "first-aid" service has grown over recent years among the larger concerns and may serve as an "ideal" and guide to others less well placed.—

"To begin, I would like to congratulate the safety personnel of the firm. During 1953, we have had only 18 reportable accidents, and none of these was a major injury. I think the most serious occurred to a man in the grey-iron coreshop, who was trapped and jammed in the core-drying stove, and sustained severe lacerations and burns to the leg, this being due not to carelessness, but over-familiarity with his job.

"As you know, I try to impress on everyone that nothing is too trivial to be treated, although I am afraid that there still remains a certain percentage of workers, notably men, who take it for granted that they must normally sustain small injuries in conjunction with their work. These people feel that it is a waste of their time and mine to have treatment, and when, in a few cases, the injuries develop complications, they are most surprised. In fact, they cannot understand why I should be annoyed when it takes me two to three weeks to cure the results of their inattention.

"The works ambulance room or, as I prefer to call it, the works surgery, is one of the most up to date in the industry. We give violet-ray and "sunlight" treatment, though I have not such a great response as I should like. I am pleased to report, however, that full advantage is taken of the radiant-heat and massage treatment. Regarding colds and chills; unfortunately these cannot be cured, but can be helped enormously. If people in close contact with others who have bad colds would only report immediately, they can really be helped. I can *prevent* a really bad cold, and so save the spreading of infection and loss of working hours.

"About eyes, may I say that on the whole we manage fairly successfully. A normal "foreign body" can be removed immediately if reported at once, but if it has been in the eye for two hours or more, a film grows over it and in that case it must be treated by a qualified person at the nearest eye infirmary. Minor burns and acid splashes of eyes can also be treated at the works, but again if I am in the least bit doubtful I feel I must send the men away for a check up as neglect for only a few hours may cause serious trouble.

"One or two matters I would like to clear up; first, to explain what happens when there are minor injuries occurring between the time I leave, at 6.0 p.m., and the time the night foreman takes over, I often have a small burn, cut or bruise reported to me (this applies particularly to the foundry) as having occurred the evening previously. On asking why this has not been treated before, the stock reply is: 'Well, I knew it was too late to see you, as you would be gone.' It should be well known that there are 'first-aid' boxes well stocked at three points about the foundry, to deal with such contingencies. Secondly, I find it rather hard to educate the female sex regarding industrial footwear. I know that in most departments good shoes become very shabby. therefore there is a tendency to say that any old shoes will do for work. This is a mistake, and many cases of slight sprains and bruising could be avoided by wearing more sensible footwear. I should like samples of industrial shoes to be put on display in various departments, especially the core-shops, when the girls would be able to see for themselves that the shoes are quite smart and very reasonable in price."

* From "Albion Works Bulletin," the house organ of John Harper & Company, Limited.

Nickel Industry Review

Dr. John F. Thompson, chairman of the Board of directors of the International Nickel Company of Canada, Limited, dealing with nickeliferous cast-iron in a year-end review of the nickel industry, stated that nickel-chromium-alloy castings were essential in heat-treating furnace equipment for both the maintenance of existing facilities and the installation of new units. A significant amount of nickel was employed in this field during 1953. Ni-Hard, the abrasion-resisting nickel-chromium cast-iron, had continued to serve in essential applications for grinding balls in the mining, cement and paint industries, and Ni-Resist, the corrosion-resisting nickel-alloy cast-iron, was again used in components of industrial equipment where resistance to corrosion, heat and wear was required. The magneto-strictive property of nickel continued to arouse interest in widening fields. One of the first applications of this interesting characteristic of nickel was in depth-finding instruments on ships, which was later expanded to "Sonal," an ultrasonic submarine detecting device. During the year several new fields employing this principle had been developed, including such diversified applications as an electronic machine-tool capable of cutting intricate shapes in the hardest materials, oil-well drill bits, which markedly increase drilling rates in hard rock, a burglar alarm, and a device for detecting whales and schools of fish.

Dr. Thompson expected that free world nickel production would reach about 172,000 tons in 1954. Based upon expansion programmes announced, the free world capacity by 1960 should be at least 75 per cent. greater than that existing in 1949.

Waterford Ironfounders' Increased Profits

According to the Report for the year ended June 30, 1953, net profit of Waterford Ironfounders, Limited, amounted to £18,154, representing an increase of £5,911, so that—when supplemented by £8,865 surplus from previous account—£27,019 (£7,274 more) is available. After payment of the 5 per cent. pref. dividend, also 10 per cent. (against 7½ per cent. for previous year) on both the "A" and "B" shares, £8,000 is paid in taxation while the amounts transferred to general reserve and pension fund at £2,000 and £3,500 respectively. The surplus carried forward, at £9,081, is £218 more than brought into the 1952-53 account.

Mr. A. H. Marsh, chairman and managing director, states: "Exactly a year ago the company was recovering from a trade depression so severe that many of the employees were laid off and others were on short time. Now, however, "the sun shines again," and for the first time in ten years Waterford Ironfounders, Limited, operates under realistic and almost normal conditions. The new plant and equipment, which took so long to obtain and to instal, is now operating at a high level of output and efficiency. Moreover, the company's order-book is well filled. This happy position has resulted from the new trading policy which was initiated 18 months ago."

A TECHNICAL HIGH SCHOOL is to be built at Bentley, near Doncaster, at a cost of £227,000. It will have the status of a grammar school, but will concentrate on engineering, building construction, and science, domestic science, and commercial courses.

Master Patternmaking Aids Production*

By H. Wilson

[SLIGHTLY ABRIDGED]

(*Continued from page* 11)

Diesel Cylinder Block

Figs. 17 to 20 are also of all-metal pattern equipment, the jigs, etc., for cylinder-block manufacture probably representing the highest standard in patternmaking attainable. The particular equipment (Fig. 17) was designed to produce 300 cylinder block castings every 8-hr. shift. The half patterns are shown mounted on separate cast-iron machined plates. They were made from accurately-cut yellow-pine masters, the castings being machined on the joint and on all flat faces; the irregular and radial shapes being scraped and filed to templates. The prints are all formed from separate castings, being Allen-screwed and dowelled into position on the pattern. The print on the drag half is cut with a flat to eliminate an awkward pocket of sand; the core which sits into this acts as a support for the jackets in assembly.

The jacket coreboxes, shown in Fig. 18, reflect first-class workmanship. As can be seen, there is a complete frame built upon the base. The barrels were made of cast iron which were trued up in the lathe and were positioned on the base with ¾-in. dia. steel pins, flanged and recessed into the bottom. The four loose sides were half checked to ensure a good shut off when the cores are being blown, and so prevent any binding when the box is stripped off the core.

Fig. 19 shows some of the half body coreboxes. They are made from a one-piece casting, with the exception of the end blanking-off pieces. The joint faces were machined and also the barrel portion; these were set up and machined on a horizontal miller. The intricate form shape shown was filed and scraped and it was from this that the operators worked to get out data lines for machining. The steel blowing bushes inserted can be seen and also the cast-iron wear pads which take the force of the sand during the core-blowing operation. The other coreboxes (Fig. 20) all have their working faces edged with ⅛-in. mild steel strips about 1 in. broad; when worn, these strips can be taken out and replaced and the box is as good as new. Also shown is the camshaft corebox, the gear end corebox and the assembly cake core into which is gummed the camshaft and jacket cores. The foundry was supplied with 30 sets of core-carriers which ensure accurate reproductions from the coreboxes.

Proving

A dummy mould was made from the drag half of the pattern, and one of the sides of the moulding box of this master mould was cut away to simplify assembly of the cores. A separate core assembly was made of the "cake" core, into which was gummed the camshaft core and both top and bottom jacket cores. This unit was placed into the dummy mould, the jackets gaining support from the small-diameter core in the drag; then through the open side of the moulding box was threaded the barrel cores.

The transfer jig, which is shown in Fig. 21, is then placed on the mould joint and with the aid of the four small feet shown, the complete core assembly is lifted and placed into position in the sand mould. This equipment was tried out in the patternmakers' own foundry under conditions as

* A Paper read before the Lancashire branch of the Institute of British Foundrymen.

FIG. 17.—*Cylinder-block pattern for a Diesel engine, designed to produce* 300 *castings per day.*

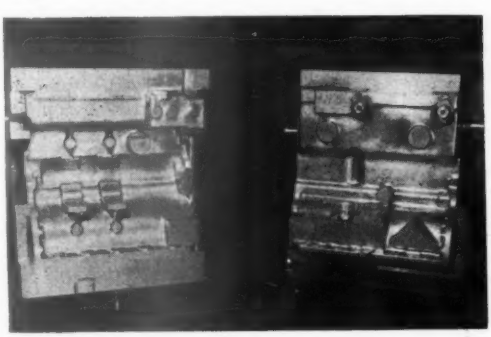
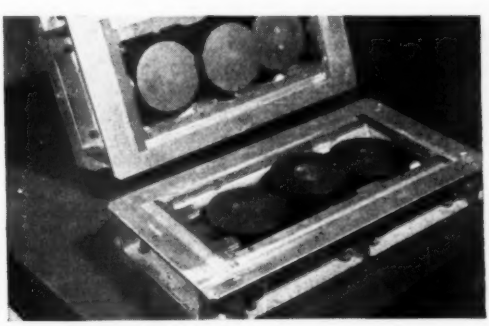


FIG. 18.—*Jacket coreboxes for the Diesel-engine cylinder block shown in Fig.* 17.



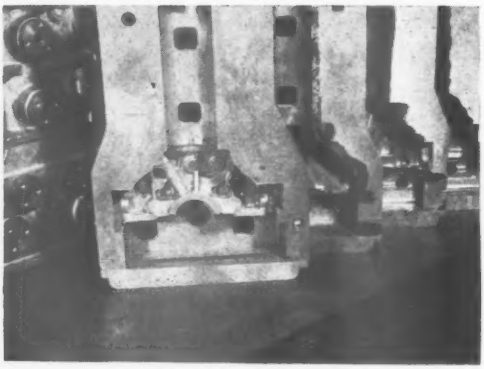


FIG. 19.—*Body half-coreboxes for the cylinder block, made from single castings except for the blanking-off endpiece.*

near to those under which it would ultimately be used. The resultant casting was marked and sectioned and, because of the size of the job, the difference between aluminium and iron contraction was allowed for when marking out with the vernier height gauge. The proof casting was sent to the customer with the complete pattern equipment. It provided him with the answer to the question which buyers of patterns always seek—that is, "can this pattern equipment be trusted?" Since this equipment was delivered, on the last visit by a colleague it was seen producing one cylinder block every 1.4 min.

Cylinder-head pattern equipment (Fig. 22) was also made for the same foundry. It is similar pattern equipment to that described, in so far that it is machined accurately throughout and all working edges of the coreboxes which are subjected to wear and loss of shape are faced with $\frac{1}{8}$-in. mild-steel strips. The water-jacket pipes were cast to size and cleaned up; this called for very accurate master patterns. As was the case with the block, core-carriers were supplied for nearly all the cores, but the only ones which possibly merit mention here are those for the jackets. A stone core was made of the jackets and left in the corebox; the pipes were removed and plaster was poured into the cavities. After cutting clearance on the sides of these plaster pipes, castings were made from them, which were filed up and bedded into position in the stone core; these were next fixed to a loose plate, dowelled to the face of the box.

No dummy mould was required for the head, as all cores were assembled on the transfer jig; the various heights were checked with steel gauges. The block core was first laid in position; it was located by three pads, the remainder of the cores being positioned in turn. The complete assembly was then gripped by the four toes and then lowered into the mould.

Induction Manifold

Founders well acquainted with the type of induction manifold shown in Fig. 23 will appreciate the very high standard of workmanship required to produce equipment for this job. The metal thickness must be strictly adhered to, plus 0.020 in. minus nothing being the accepted standard. The changing sections of the body requires very careful working of thin metal templates, both in the coreboxes and on the pattern to keep to these limits. The undercut from the split centre-line is overcome by moulding down locally to prevent adding surplus metal. The coreboxes for this job were all made with blowing bushes and cast-iron wear pads to withstand the wear and tear of core-blowing production.

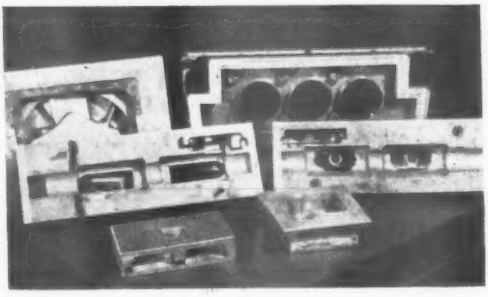
Other Metal Coreboxes

Figs. 24 and 25 show three of a set of metal coreboxes which were made recently for a main casing casting. There was already in existence a metal pattern and a complete set of mahogany coreboxes and, it being a job which was subject to mass-production methods, the foundry decided to replace the mahogany coreboxes with metal steel-faced boxes suitable for core-blowing.

The problem posed was that the customer could not spare the pattern for any length of time, as he still wished to continue using the existing equipment, but at the same time was very anxious to have the proper tackle. This called for very close co-operation; first of all the patternmaker made layouts of the various sections from the drawing and with the aid of sketches taken from the existing boxes all excess metal and taper allowances were added to the layouts. Midway through the job another check was made on the existing equipment and the metal coreboxes completed. The general metal thicknesses throughout the coreboxes is $\frac{5}{16}$ in. and they are well ribbed up and filleted to give added strength.

Fig. 24 shows the main corebox, the loose end web is shown removed and it should be noted that it is shaped out on back for lightness and good fitting. The loose side rail is also removed to give a clearer view of inside of box. The end corebox is of a very similar type, in so far that it is a

FIG. 20.—*Group of additional coreboxes for the cylinder-block job. Each has replaceable wear strips fitted.*



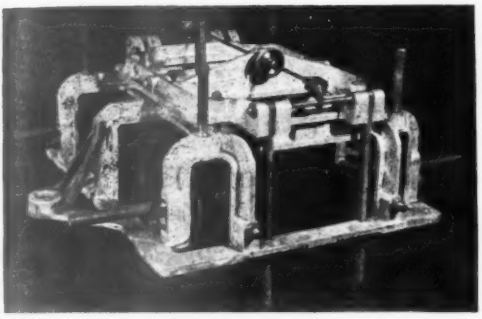


FIG. 21.—*Transfer jig, with the aid of which the complete core assembly is carried into the cylinder mould.*

continuation of the sloping top wall of the casing. Both boxes are built up in sections, each comprising five castings—steel faced around the edges. Fig. 25 shows one of the side coreboxes and in the foreground a sand core taken from it. The side rail of the box is worked loose, and fits into a check at the bottom for accurate positioning.

Typewriter-body Casting

The next example [exhibited] is a sample casting for a typewriter main casting, together with one machined and finished ready for assembly of the machine. The equipment for this job consisted of a two-part mounted pattern, the pattern itself being made in high-grade cast iron. The pattern "masters" were accurately made, filing allowance being arranged around the profile and sufficient being added on the flat faces to enable skimming-up to be done on the milling machine. The "drag" pattern was made in the form of an insert and set into the patternplate. The various steps in the joint call for the highest accuracy to ensure absence of "crush" at the points where the joint shapes change. On a mass-production job of this type, the foundry expects a casting which is true to shape and design, requiring the very minimum of fettling.

FIG. 22.—*Cylinder-head pattern equipment, made for the same customer as the Diesel-engine jobs; similar manufacturing procedure was followed.*

1,000-amp. Switch-box

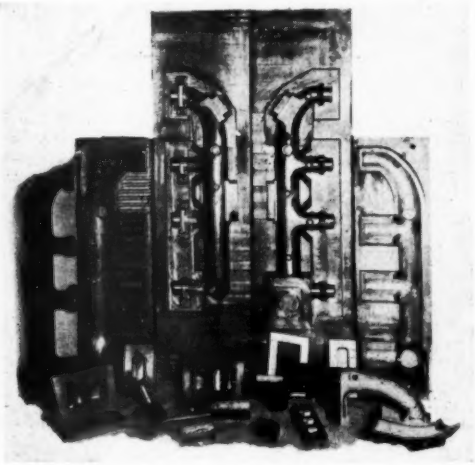
There are in the Author's foundry a number of yellow-pine patterns covering a large range of electrical switch-boxes from which the production foundries are supplied with aluminium castings. With the natural decline in the quality of the castings, owing to the absence of good durable pattern equipment, the actual foundry has been persuaded on the grounds of overall economy to purchase all-metal pattern equipment.

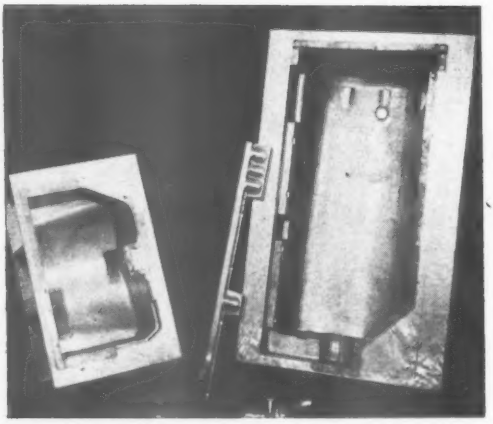
The new moulding method for this switch-box provided for an all-moulded job, requiring no body cores, but end cores instead as shown in Fig. 26. For the metal equipment, the top part was machined all over and had a good stripping taper all round; it had approximately $\frac{5}{16}$-in. metal thickness and was well ribbed up inside to withstand heavy, continuous ramming. The drag print was comprised of five large castings bolted and dowelled together; this was machined all over and there were dovetailed loose-pieces for withdrawal from the mould after ramming. The equipment paid for itself after producing 80 castings, the direct foundry labour costs being reduced on each item to the extent of 60 per cent. At the same time, the foundry was producing a vastly superior casting, consistently accurate, and involving much less finishing.

Motor-car Water-pump Body

The final example chosen is of all-metal "mechanized" pattern equipment for a motor-car water-pump body. It is of the two-part "plated" type for

FIG. 23.—*High-class metal pattern and corebox equipment for an induction manifold.*





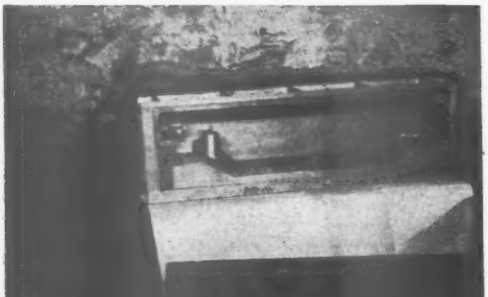


FIG. 24 AND 25.—*Three of a set of metal coreboxes made for a main casing casting.*

producing four castings per box. In Fig. 27 a back view of the drag plate showing the mechanism on the right-hand side is illustrated. Fig. 28 shows the drag plate with its four patterns. The four projecting bosses would normally be moulded by putting a core beneath them, or they would be worked " loose " with a dovetailed piece, but both these methods are not very satisfactory when the hazards which they usually introduce are considered—such as mismatching on the form shape, misshapen bosses, etc.; by substituting the mechanism these troubles are eliminated and also there is the benefit of speedier production. Fig. 29 gives a sketch of the working of the withdrawal mechanism. The aluminium pattern has a phosphor-bronze bush cast in position and bored to take the mild-steel boss. The levers are also made of phosphor bronze; note the strong spring which presses the boss back into position when the handle is released.

Patterns Exhibited

Concluding, the Author then showed examples of high-class master patterns covering a wide range of different types of work. They were all of yellow pine with the one exception—that of a protractor head—here the Author made a rough yellow-pine master and made two castings from it. These were machined and turned to produce a double-contraction, split aluminium pattern. This in turn was used to make the six finished patterns which were cast in brass. Accuracy of shape and dimension were very important; these jobs being made to within plus 0.010 in. of finished pattern size and were filed and scraped to required dimensions.

Purchasers of patterns should specify clearly where the cheapest possible pattern is required for " one off " jobs, and should obviously be prepared to invest in a better-quality pattern where larger, or repeat quantities of castings are required. After all, a pattern is normally always a " one off " job, and any improvement incorporated in it represents a repetitive saving with every casting produced.

The Author expresses his thanks to the directors of John Vickers & Sons for permission to present this Paper, and to colleagues in that company and its associate, Daralum Castings, for help and encouragement. Also he thanks the various firms for their kind permission to use their products in his illustrations, and particularly mentions in this connection Whessoe, Limited (Darlington); Electro-Mechanical-Manufacturing Company; Leyland Motors, Limited; Ferranti, Limited; Armstrong-Whitworth (Pneumatic Tools), Limited, and Peter Brotherhood, Limited. Finally, acknowledgment is made to the *Northern Echo* for one of the illustrations.

DISCUSSION

After a vote of thanks had been accorded to the Author on the proposal of MR. SPENCELEY, seconded by MR. JOHN STOTT, the former asked the lecturer whether the foundry staff were taken into consultation when considering pattern construction.

MR. WILSON, in reply, said he always, before making any equipment, had the customer's close co-operation.

MR. HAYNES said the Author had made no reference to the designer and the need for his co-operation, which was an essential feature for rapid production.

Choice of Timber

MR. VAN DER BEN, referring to timber, asked for the cardinal point in deciding between a pine pattern and a mahogany pattern, both as to size and quantity, required from a pattern. Nowadays, quite a number of large—or reasonably large—castings had to be made with a very fair degree of accuracy.

MR. WILSON replied that the large pattern he mentioned was used for about 40 castings, over

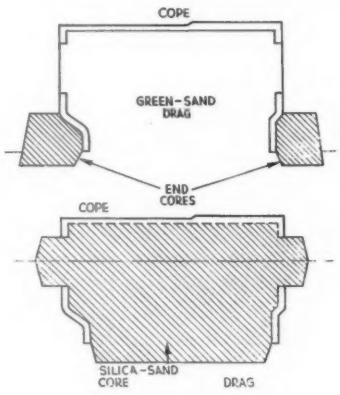


FIG. 26.—*Old method of producing a switchbox casting, involving a large body core and (above) the modern set-up, for which only end cores were required.*

quite a long period, but something more than 40 castings could be expected from a mahogany pattern.

MR. VAN DER BEN, amplifying his question, posed the example of a pattern 12 ft. long, 6 ft. high, and 4 ft. wide, and asked whether such a job would be a reasonably practical proposition made in mahogany.

MR. WILSON replied that it would be quite practical, but it depended, of course, on what mahogany it was made from. Sometimes a job like that could be done better in good-class yellow pine than third-class mahogany. Of course, the mahogany would withstand the extra knocking about which the yellow pine would not.

FIG. 27.—*Back view of the "drag" patternplate for a motor-car water-pump body showing (r.h.s.) the stripping mechanism.*

MR. HARVEY asked whether the customer specified the runner-system and, if so, how the patternmaker could prove the system when he used aluminium and not iron for the purpose.

THE LECTURER replied that the runner system was only attached to the pattern at the request of a customer.

MR. MILLINGTON asked whether the Author had any case where the customer had complained that the metal pattern had become loose on the plate. From personal experience, the most difficult type to fasten on a plate was a metal pattern.

MR. WILSON described, by means of a sketch, the method he would adopt for such a case.

Suitable Types

MR. HAYNES asked the Author to give his opinion as to the best type of pattern to use for mass production, where hot sand might be encountered.

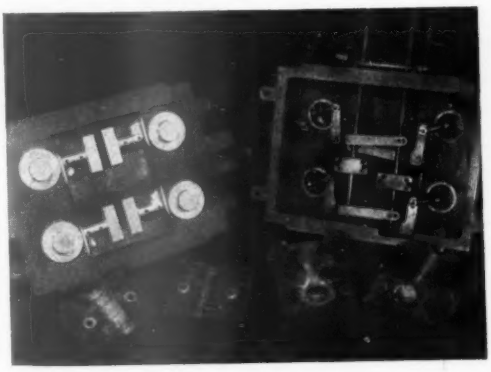
MR. WILSON replied that unquestionably a cast-iron pattern was desirable with aluminium patterns as a very close second.

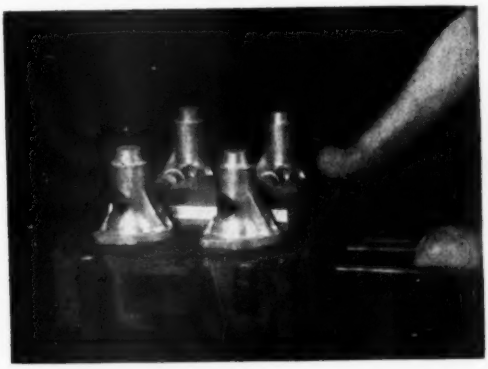
MR. CONNOR, referring to a picture of a valve pattern with a twin ingate, said from personal experience that particular type was not very good practice, because contraction could interfere. He preferred to see two separate ingates and two separate downgates.

MR. WILSON said he had made this type of casting for a considerable length of time with complete success by the method shown, as it was designed in co-operation with the foundry firm, and with good results. It had an overall length at the top of about 12 in.

MR. LONGSTAFFE, as regards the pump pattern, asked whether the reverse method had been tried, involving loose flanges and so forth. Was that pattern mechanism only designed for that particular job and was it for use on a mechanized plant, or for hand-moulding on a hand-draw machine?

FIG. 28.—*View of the working face of the pump body pattern assembly showing also the method of operating the stripping mechanism.*





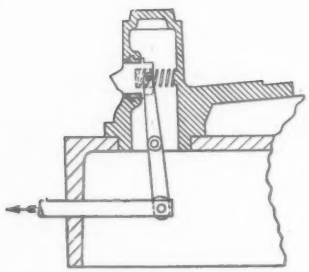


FIG. 29.—*Detail of the stripping mechanism for the projecting bosses of the pump-body pattern.*

MR. WILSON said this was not the first time he had made equipment of the type described. It was definitely made for mechanized production. Of course, the same idea could be used for a hand-moulding.

MR. HANDLEY asked what was the lecturer's normal draft allowance on a pattern—always a very vexed question in the foundry. Again, mahogany had been mentioned, what type was generally used? The type he had in mind was considerably cheaper than yellow pine. Some of the best-quality yellow pine timber was of the order of 4s. to 5s. per sq. ft. Mahogany bay wood could be had at considerably less than half that price. No reference was made to the seasoning of the pine and it was rather astounding to learn of pine dating from 1930, for but few firms could devote space or time for storage of that order.

MR. WILSON found no difficulty with the question of draft, which he answered by quoting from the patterns exhibited. Referring to the timber query, he said the type of mahogany was similar to Honduras mahogany and it was used very carefully. The yellow pine was not actually in store but a useful source of supply was discovered.

Pattern Stability

MR. HAYNES, referring to a pattern 18 ft. long, with reinforcing struts, asked whether it was the skill in inserting these struts which ensured the stability of the pattern. He himself had had experience recently of a pattern "growing" by $\frac{3}{16}$ to $\frac{1}{4}$ in.

MR. WILSON, in reply, said that he was very proud of the pattern construction referred to. When the blocks were removed from each of the frames, the frame would be seen to move. If it did not, the pattern would stay up. When it was stated that the pattern had grown $\frac{1}{8}$ in., this was probably due to the struts not having been put in properly.

MR. HARDING pointed out that with such a pattern the damp sand of the mould would cause it to expand. Was there any allowance made between the boards?

MR. WILSON said the space allowed between the boards and mentioned in the Paper was to permit such expansion.

Belgian Foundrymen's Association

Annual General Meeting

The *Association Technique de Fonderie de Belgique* (Belgian Foundrymen's Association) held a two-day conference in the late autumn in Charleroi. New grades of membership to include craftsmen and students were created. The retiring directors, Mr. Commins, Mr. Deprez, Mr. L. Foulon, Mr. Halbart, Mr. J. Weins, and Mr. Lamoureux were re-elected for a further four-year period. Mr. Groutaers was co-opted as president of the Liège branch. After the presidential address by Mr. Goffart, the Association's "Medal" was awarded to Mr. Hector Hublet for his outstanding work on technical training. Previous awards of this medal have been made to Mr. Lamoureux, Mr. Varlet, Mr. Ledint and Mr. Borgerhoff. After the general meeting, the Université de Travail were the hosts at a cocktail party for the members. Technical papers at the first session were given by Mr. Frank Hudson, Mr. Ophoven and Mr. Lamoureux. Mr. Hudson's contribution took the form of a film show on brassfoundry productivity, the chairman, Mr. Bairiot, acting as interpreter. Mr. Ophoven's paper was on "Progress through Co-operation," in which the Author outlined the essential particulars of some social experiments carried out in his foundry and showed the results in a "before-and-after" film. The final paper by Mr. Lamoureux was on a "Contribution to Output." He showed by using commonsense, logic, and keeping economy always in view how it was possible considerably to reduce certain costs.

The second session opened with a paper by Mr. Buttrey on shell moulding, in which the newer techniques were described. Then Professor De Sy dealt with the benefits which Belgian foundrymen could obtain by the continuous operation of either acid or basic cupolas. Finally, Mr. Boussart repeated his Paris "international conference" paper on "Notes on the Utilization of Sand Tests." The programme included visits to three works, excursions for the ladies, and an annual banquet—a feature of the last function being a "revue" by Mr. Lamoureux covering the work of the Association, the parts being taken by the younger and "not so young" members. The congress, which was a great success, was organized by Mr. Malacort (local honorary secretary, Mr. Dines and Mr. J. Foulon, the manager of the *Association*.

Iron-ore Imports

Iron-ore imports in November and the total for the 11 months of the year, with comparative figures for 1952, are shown below.

Country of origin.	Month ended November 30.		Eleven months ended November 30.	
	1952.	1953.	1952.	1953.
	Tons.	Tons.	Tons.	Tons.
Sierra Leone	54,040	100,550	713,092	726,158
Canada	9,680	74,514	613,198	1,028,043
Other Commonwealth countries and Eire	32,428	10,880	82,608	187,144
Sweden	319,935	333,122	3,350,198	3,508,355
Netherlands	2,640	2,831	39,302	27,095
France	26,663	34,064	381,545	410,081
Spain	29,561	28,664	619,495	411,575
Algeria	131,383	124,905	1,566,696	1,713,792
Tunis	35,320	41,950	523,484	525,545
Spanish ports in North Africa	12,850	—	237,513	—
Brazil	9,060	27,102	91,138	280,158
Other foreign countries	91,207	121,136	709,792	1,308,584
TOTAL	754,767	899,718	8,928,061	10,126,530

Pig-iron and Scrap Position

An essential of the iron and steel industry's current development plan for the U.K., as revealed by the Iron and Steel Federation, is the expansion of pig-iron production, with the ultimate target of an annual output of 15,000,000 tons. Progress in that direction has not been as rapid in the past 12 months as has been the expansion of ingot capacity. The increase in the output of pig-iron last year was around half-a-million tons, and in point of fact there are fewer blast furnaces working to-day that there were in December, 1952, when 106 were in operation. Tables I and II give the monthly position for 1953 and comparable annual outputs respectively.

Construction costs are appallingly high, but increased productivity is not the only advantage. A substantial saving in fuel is not the least of the rewards of better equipment and improved technical efficiency. The closer attention to the grading, crushing, and sintering of ore has been abundantly vindicated by results and is now the accepted practice in all modern plants.

TABLE I.—*Pig-iron and Steel Production.*

Month.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
	Tons	Tons	Tons	Tons
January ..	213,900	11,121,000	346,300	18,009,000
February ..	213,500	11,104,000	352,400	18,325,000
March ..	215,700	11,216,000	351,400	18,272,000
April ..	212,800	11,063,000	348,500	18,124,000
May	214,700	11,165,000	350,700	18,236,000
June	210,600	10,949,000	337,700	17,559,000
July	202,400	10,524,000	276,600	14.383,000
August ..	204,400	10,629,000	291,400	15,155,000
September ..	213,900	11,123,000	346,500	18,019,000
October ..	221,500	11,519,000	355,000	18,462,000
November ..	228.500	11,883,000	363,000	18,878,000

TABLE II.—*Annual Outputs of Iron and Steel.*

Year.	Pig-iron.	Steel ingots and castings.
	Tons.	Tons.
1936-38 (average) ..	7,568,500	11,722,100
1939	7,979,800	13,221,300
1940	8,204,600	12,975,300
1941	7,392,500	12,312,200
1942	7,725,600	12,941,700
1943	7,186,900	13.031,200
1944	6,736,500	12,142,200
1945	7,107,400	11,824,400
1946	7,761,200	12,695,300
1947	7,784,600	12,724,500
1948	9,276,400	14,876,600
1949	9,498,500	15,562,900
1950	9,632,900	16.292,700
1951	9,668,000	16,007,000
1952	10,728,000	16,418,000
1953*	11,200,000	17,600,000

* Estimated.

National Scrap Drive to End

Twelve months ago the British Iron and Steel Federation described the scrap position as "a little better than had been expected." The supply of home scrap was appreciably better than in 1951, the steelmakers themselves found about 270,000 tons of scrap over and above their normal arisings, imports had increased by 137,000 tons, and circulating scrap increased in line with the rise in steel production.

These improving trends have all been maintained during 1953. Increased imports and deliveries of home scrap have been a material factor in the achievement of a record output of steel. There has been no reckless use of these extra tonnages. Depleted stocks have been built up, and at the end of September last amounted to 629,000 tons, compared with 376,000 tons a year earlier. Reserves, in fact, have now attained reasonable proportions and it has been decided to terminate forthwith the national scrap drive.

This decision has not been reached without careful consideration of the pros and cons. Emphatically it does not imply that the intensive effort to bring maximum tonnages into consumption can be abandoned. No doubt the recent slackness in the iron foundries has eased the pressure for cast-iron scrap, but the need for prepared scrap for the steel furnaces is still insistent and it would be disastrous if the recent improvement were permitted to create a false sense of security.

If more steel is to be made in 1954, still more scrap will be required, and all that is implied by the termination of the national organization for the collection of scrap, is that outside sources have been "milked dry" and the trade can be safely left in the hands of the merchants whose long experience and individual contacts are always at the service of the steel industry.

Expensive Imports

In rebuttal of any mood of complacency the fact may also be cited that somewhere between 850,000 and 900,000 tons of scrap were imported last year at an average cost of about £20 per ton. It has involved, of course, a severe strain on the national economy and a financial burden upon the steel industry which has only been justified by stern necessity.

One improving source of supply is the consignment of more ships to the shipbreaking yards. The total imports for the first 11 months of this year were 203,830 gross tons, compared with 79,900 gross tons in the same period of 1952. Probably supplies from this source will continue to improve, but the wide disparity between the maximum prices for home scrap and the high cost of imported material should not be overlooked. The official view is that higher prices would not materially increase the supply of home scrap and unless there is conclusive evidence to the contrary, no further variation of prices in the home market can be expected.

THE PROMOTION of the development of the home and oversea markets for electricity and electrical appliances is to be the theme of the sixth British Electrical Power Convention which is to be held at Eastbourne from June 14 to 18. Delegates from 37 electrical organizations from all parts of Great Britain, Northern Ireland, Isle of Man and the Channel Islands, will meet in the Winter Garden under the presidency of Mr. J. R. Beard, C.B.E., M.SC., M.I.C.E., M.I.E.E., F.A.I.E.E., who represents the Association of Consulting Engineers.

Personal

AIR CONTROL INSTALLATIONS, LIMITED, announce that Mr. P. Tatlow has been appointed sales manager in the general engineering department.

MR. CHARLES REID has been appointed chairman of Electric Construction Company, Limited. MR. W. M. B. FURNISS has been appointed managing director.

Tube Investments, Limited, announce the appointment of Major-General R. F. BELCHEM, C.B., C.B.E., D.S.O., for special duties as a member of the personal staff of the chairman, Mr. Ivan Stedeford.

MR. ANTHONY L. HARDING, formerly assistant manager, Grosvenor House Hotel, Park Lane, London, has been appointed catering manager to the Sheepbridge Group, which possesses six canteens at the various works of its subsidiaries.

THE RETIREMENT from the Board of directors of the Audley Engineering Company at Newport of Mr. W. E. Parker has been announced. He has been a member of the board for the past 14 years. In 1913, Mr. Parker was one of the founders of the British Rolling Mills, Limited, of Tipton, and has been managing director of that company ever since, a position which he is to retain.

AFTER NEARLY 30 YEARS as secretary of the University of Birmingham, Mr. C. G. Burton is to retire. He will be succeeded at the end of the present session by Mr. G. L. Barnes, who was appointed assistant secretary in 1946, has been deputy secretary for the past two years and was the recipient of a degree of Master of Arts at last July's Degree Congregation.

MR. D. WATERHOUSE has retired as director and chairman of Prince-Smith & Stells, Limited, textile machinery makers, Keighley. He joined Prince Smith & Son in 1918 and was one of the original directors of Prince-Smith & Stells when this company was formed in 1931. Mr. K. H. Preston has been elected a director and chairman. He is chairman of Platt Brothers & Company (Holdings), a director of the Midland Bank and a member of the management Board of the Engineering and Allied Employers' Federation.

MR. C. A. BICKLEY, of Granville, Norton Road, Pelsall, Walsall, chairman and managing director of the Walsall ironfounding firm of Kirkpatrick, Limited, and chairman of the Malleable Ironfounders' Association, has been appointed as a magistrate for the Aldridge Petty Sessional Division of Staffordshire. Mr. Bickley is also a member of the Walsall Employment Committee; the National Health Insurance Advisory Committee; the Youth Recruitment & Training for Industry Organization, and the newly constituted Productivity Council for Walsall and district.

MR. C. H. KAIN (joint managing director, Lake & Elliot, Limited, Braintree), the newly-elected chairman of the British Steel Castings Research Association, made his first official visit to the headquarters of the Association in Sheffield on December 30, to inspect the laboratories and the work in progress. Subsequently he entertained the research and technical staff of the Association to dinner, together with Professor R. J. Sarjant, O.B.E., and Dr. J. White, of Sheffield University. Mr. Kain was supported by two members of Council—Dr. E. Gregory, chairman of the Association's research committee, and Brigadier A. Levesley, chairman of the Council's planning committee dealing with the new experimental foundry and research laboratories which the Association proposes to erect in Sheffield.

MR. W. J. MILLAR, who was managing director of Efco Engineering Company, Limited, joint managing director of Electric Resistance Furnace Company, Limited, and a director of Electric Furnace Company, Limited, and Electro-Chemical Engineering Company, Limited, retired on January 1, 1954, having reached the stipulated age. Mr. Millar received his technical education at the City & Guilds of London Technical College, and, setting out to be a mechanical engineer, joined Robey & Company of Lincoln as a pupil apprentice. He subsequently served in the engineering department of Thos. Firth & Sons, Sheffield, where, for a period of four years he was engaged on large steel plant construction. In 1919 he entered the electric furnace industry, then in its infancy, under Mr. D. F. Campbell, chairman of the E.F.C.O. Group. He became a director of Electric Resistance Furnace Company, Limited, in 1929, and of Electric Furnace Company, Limited, in 1941. His departure from the Group will be widely regretted.

Obituary

MR. WILLIAM CHARTERS, aged 66, last week collapsed and died at Hopkinsons, Limited, valve makers, Britannia Works, Birkby, Huddersfield.

MR. W. FRANKHAM, who for 50 years worked as a metal patternmaker for H. Frost & Company, Walsall, died last month at the age of 68. Mr. Frankham completed his 50th year of service with the firm last September and was then presented with a gold watch.

THE DEATH has occurred of Mr. Walter Stephen Lloyd Willey, who had been a director of Thomas Hill-Jones, Limited, "Invicta" Works, Bow Common Lane, E.3, for many years, and who had been associated with the firm for nearly 50 years. He was a Fellow of the Chemical Society and a Fellow of the Royal Society of Arts.

THE DEATH is announced of Mr. W. Thomason, F.R.I.C., chairman of Stewart & Gray, Limited, vitreous enamellers and enamelling engineers, in his 81st year. Mr. Thomason had taken an active part in this Company's affairs from its inception in 1919 right up to the time of his death. His contributions to the welfare and promotion of the vitreous-enamelling industry were widely known and he will be greatly missed by many throughout the enamelling and ceramic worlds.

THE DEATH OCCURRED on January 3 of Mr. Robert Arnold Blakeborough at the age of 72. Mr. Blakeborough was chairman and managing director of J. Blakeborough & Sons, Limited, engineers and valve makers, Woodhouse Works, Brighouse, of which firm he was the longest serving member, with a record of 57 years' service. Illness prevented him from presiding at a ceremony in the canteen works on the previous Saturday evening, at which long-service awards were made to employees. He was the grandson of the founder of the firm—the largest employers of labour in Brighouse.

MR. JESSE WILLIAM SHAW, a director for more than 40 years of John Smith & Company (Derby), Limited, brass and aluminium founders, of Cotton Lane, Derby, and Burton, has died at his home at Mickleover. He had been connected with the firm for over 60 years, and was a member of the management Board of the Engineering and Allied Employers' National Federation, and also a member of the Federations' executive committee in Derby. He was vice-chairman of Burton and District Engineering and Allied Employers' Association for more than 20 years; and a life member of Derby Society of Engineers.

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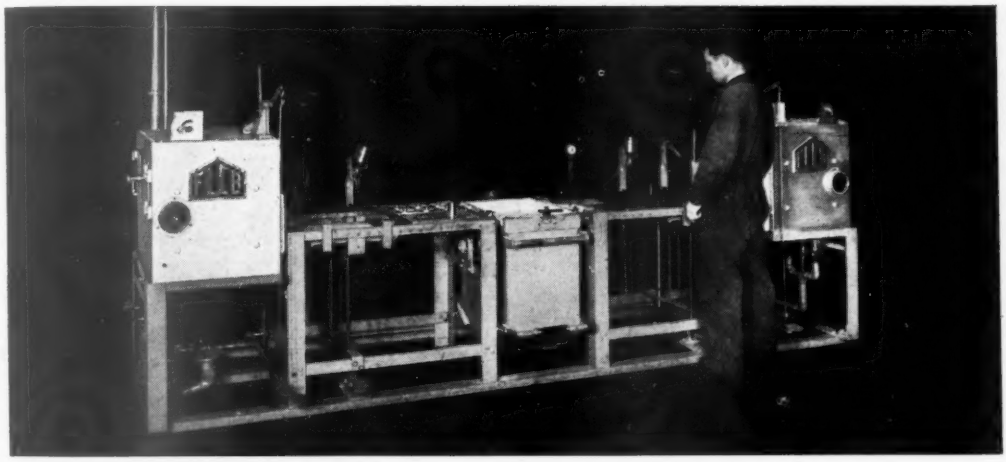

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The Shelmolda brings this modern process within the reach of the smallest foundry. The standard machine illustrated here produces shells 23″ x 15″ but other sizes can be built to requirements. We shall be pleased to arrange for the Shelmolda to be seen working in our foundry.

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News in Brief

CRADLEY FOUNDRY COMPANY LIMITED has had plans approved for the construction of a new factory at Maypole Hill, Halesowen.

A WOLVERHAMPTON AND DISTRICT local productivity committee has been formed, of which the chairman, Mr. C. L. Old, is a director of the National Foundry College.

THE SECOND NATIONAL FACTORY EQUIPMENT EXHIBITION is to be held at the Horticultural Halls, Vincent Square and Greycoat Street, Westminster, London, from March 22 to 26.

HOLMAN BROTHERS, LIMITED, are moving on February 6 their London Office from Broad Street House, where they have been for many years, to 44, Brook Street, London, W.1. Telephone No.: Hyde Park 9444; telegraphic and cable address: Airdrill, London.

THE MINISTRY OF MATERIALS has reduced its selling price for tungsten ores of standard 65 per cent. grade and ordinary quality by 20s. per ton. The revised prices, which came into effect on January 5, are:—Wolframite, 165s.; scheelite, 150s., per ton, delivered consumers' works.

SAML. DENISON & SON, LIMITED, makers of weighing and testing machines, Hunslet Foundry, Leeds, 10, have opened an office at the White House, 111, New Street, Birmingham, 2. Tel.: MIDlands 3931; 'grams: Weigh, Birmingham. Mr. B. A. Lewis has been appointed Midlands manager.

THE MAUDSLAY SOCIETY announce that no Maudslay Scholarship is to be awarded for 1953. Selection of Scholars is by a joint committee of the Society and the Junior Institute of Engineers and it was their unanimous decision that none of the applicants attained the high standard necessary to qualify.

THE UNITED STEEL COMPANIES, LIMITED, announce a record steel ingot production of 2,374,687 tons in 1953. This is the highest ever produced in the British Commonwealth by a single company in one year and beats their previous best of 2,216,427 tons in 1952 by about 160,000 tons. Pig-iron production also reached a record level of 1,374,554 tons during the past year.

IT IS REGRETTED that in a note, which appeared on page 767 of our issue of December 17, 1953, it was stated that the firm of Shutler & Son proposed to remove from Seven Kings, Essex, to New Romney. This is not true; what is happening is that owing to increase in business it is proposed to open a branch at Littlestone, in the Borough of New Romney, whilst retaining the headquarters in Seven Kings.

WEDNESBURY COUNTY COMMERCIAL COLLEGE is urging Black Country firms to encourage their executives and foremen to attend its classes to learn more about solving production problems. The course of classes commencing on January 19 is being organized by the recently formed Walsall and District Productivity Committee and is entitled "Productivity and the Human Factor." Mr. E. W. Snowdon, director and general manager of the James Bridge Copper Works, Walsall, is chairman of the committee.

THE NORTHERN ALUMINIUM COMPANY, LIMITED, announces that the following staff changes have been made at Northern Aluminium Company's Foundry and Forge, Middlemore Road, Handsworth, Birmingham. Mr. F. Howitt relinquishes the position of technical superintendent and deputy manager on being transferred to a sister company, Aluminium Company of Canada, Limited, Montreal. Mr. S. Wilding is appointed production manager, being succeeded as works engineer by Mr. D. A. Ellis. Mr. A. R. Martin assumes the full responsibilities of chief metallurgist.

TWO AERO-ENGINE CARBURETTORS, identical with those used on more than 4,000 Rolls Royce "Eagle" engines, produced during the first World War, were put on display at the Birmingham factory where they were made—Charles H. Pugh, Limited, Small Heath—to commemorate the golden jubilee of powered flying. Many hundreds of the carburettors were made by the firm under sub-contract, and two pairs were fitted to the "Eagle" engines which powered the Vickers "Vimy" bomber which made the first non-stop crossing of the Atlantic in June 1919. The souvenirs have remained at the factory for 35 years.

THE 300-TON TESTING MACHINE in the Civil Engineering Department of Birmingham University, which has just accomplished the task of calibrating the giant crane weigher made at the West Bromwich works of George Salter & Company (illustrated in the JOURNAL of December 17) is almost 50 years old. It has been used for many tension, compression and bending tests. Components for the airship R-100, culvert supports for railways, and springs for dock gates have been dealt with. At present, a programme is being carried out of tests on welded-steel structures for the Shipbuilding Research Association.

SPECIALISED HEAT TREATMENTS (DAWLEY BROOK), LIMITED, are to appeal to the Ministry of Housing and Local Government against the "unduly restrictive conditions" imposed by Brierley Hill Urban District Council, when granting a licence for a Kingswinford factory. In granting permission for the change from a general to a special industry, the council had laid down that no additional plant could be installed without the firm's making a new application to the planning committee. Since the plans were passed on November 2, the firm had twice requested that, since their work was of national importance, the restrictions should be removed. Both requests were refused, hence the appeal to the Ministry. The firm, it is stated, had already agreed that no process other than heat-treatment should be carried on. It is pointed out that delay in the production of steel would follow if permission had to be sought to install new equipment.

A transposition of lines caused an error in the "Book Review" in the December 31 issue, page 818. Dealing with "Industrial Inorganic Analysis" by Roland S. Young, paragraph two should read:—

The analytical procedures in this book are essentially "wet" methods. Techniques involving instrumentation, *i.e.*, absorptiometric, spectrographic and polarographic, are not included. Almost inevitably the bulk of the matter is of most direct interest to the metallurgical and allied industries. Other applications, however, such as the fertilizer industry, have not been forgotten. As would be expected from the author's mining experience, ore analysis is well catered for.

Shortage of Science Teachers. A one-day private conference called by the Federation of British Industries to discuss the problem of the shortage of science teachers, its effects on industry, and possible solutions is being held at the Institution of Electrical Engineers. Sir Harry Pilkington, President of the F.B.I., will open the conference. At the morning session Sir Charles Morris, Vice-Chancellor of the University of Leeds, will speak on "Science teachers—the demand and the supply"; Dr. A. W. Barton, headmaster of the City of London School, on "The present position in the schools and some possible consequences"; and Dr. P. Dunsheath, C.B.E., Chairman of the F.B.I. Education Committee, on "The industrial viewpoint."

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FS/14

Imports and Exports of Iron and Steel in November

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in November. Figures for the same month in 1952 are given for the purpose of comparison, and totals for the eleven months of 1952 and 1953 are also included. (All figures are in tons.)

Exports of Iron and Steel and Destination

Destination.	Month ended November 30.		Eleven months ended November 30.	
	1952.	1953.	1952.	1953.
Channel Islands	653	627	6,333	6,443
Gibraltar	46	151	1,592	1,482
Malta and Gozo	179	504	2,077	4,093
Cyprus	1,141	644	6,678	9,299
Sierra Leone	412	579	4,620	8,967
Gold Coast	5,105	3,447	36,051	39,080
Nigeria	5,329	9,684	46,068	63,154
Union of South Africa	11,822	4,943	124,309	99,036
Northern Rhodesia	3,798	1,554	27,706	19,697
Southern Rhodesia	2,480	8,354	50,280	65,735
Tanganyika	2,585	1,574	20,353	17,104
Kenya	5,968	9,736	42,379	80,511
Uganda	1,219	849	6,879	10,936
Mauritius	998	619	5,763	7,923
Bahrein, Qatar, and Trucial Oman	2,320	3,645	18,198	28,439
Kuwait	2,515	2,526	14,701	24,311
India	7,408	8,139	69,766	80,657
Pakistan	2,816	4,812	61,556	35,754
Malaya	8,958	5,593	72,424	67,019
Ceylon	1,235	2,578	20,334	23,384
North Borneo	132	1,273	3,427	6,823
Hongkong	3,838	1,705	24,636	27,054
Australia	22,676	17,188	274,234	157,857
New Zealand	13,787	11,069	136,870	114,195
Canada	17,156	20,326	175,882	197,733
Jamaica	2,279	2,182	25,258	18,694
Trinidad	4,605	2,960	42,874	40,214
British Guiana	582	455	5,246	5,893
Anglo-Egyptian Sudan	1,866	2,811	18,216	25,022
Other Commonwealth	5,472	5,134	34,224	65,321
Eire	7,581	5,977	60,585	56,256
Soviet Union	—	—	2,041	1,012
Finland	4,539	2,288	46,991	27,358
Sweden	9,525	10,269	104,308	79,078
Norway	6,797	11,307	58,950	75,892
Iceland	173	454	2,668	3,801
Denmark	6,203	9,729	68,496	93,950
Poland	34	108	167	828
Western Germany	329	186	1,701	6,653
Netherlands	14,510	10,853	99,679	131,732
Belgium	1,183	1,327	8,409	24,055
France	777	709	4,461	12,274
Switzerland	1,265	1,181	9,013	11,846
Portugal	1,229	1,260	9,102	15,377
Spain	1,613	524	8,615	5,570
Italy	8,122	6,128	18,859	61,854
Austria	80	101	550	1,432
Yugoslavia	384	412	4,399	6,659
Greece	262	562	3,195	15,363
Turkey	1,163	1,711	8,297	13,939
Netherlands Antilles	1,962	1,161	14,893	11,281
Belgian Congo	355	200	2,789	2,889
Angola	1,157	427	3,856	7,011
Portuguese E. Africa	263	263	4,287	2,978
Canary Islands	79	23	686	496
Syria	102	254	1,988	2,779
Lebanon	738	144	9,501	4,646
Israel	1,556	757	13,865	9,413
Egypt	2,556	1,308	32,604	25,869
Saudi Arabia	357	394	6,779	5,096
Iraq	5,537	12,691	46,731	76,843
Iran	842	27	9,258	3,179
Burma	886	2,769	11,214	22,198
Thailand	2,206	423	12,280	10,004
Indonesia	1,086	1,381	14,954	14,855
China	11	—	290	703
Philippine Republic	544	788	4,586	4,074
U.S.A.	940	2,011	44,327	91,617
Cuba	175	118	2,036	3,158
Colombia	740	442	4,264	9,802
Venezuela	9,414	2,155	45,798	43,341
Ecuador	232	311	3,752	2,397
Peru	718	398	7,783	9,555
Chile	392	131	2,980	2,935
Brazil	237	30	19,590	2,201
Uruguay	40	1,624	4,037	5,660
Argentina	2,162	1,185	32,927	11,599
Other foreign	2,760	2,189	22,738	24,312
TOTAL	243,196	234,351	2,280,213	2,407,650

Imports of Iron and Steel and Origin

From	Month ended November 30.		Eleven months ended November 30.	
	1952.	1953.	1952.	1953.
India	255	1	531	173
Canada	22,918	1,320	156,909	66,934
Other Commonwealth countries and Eire	4,480	12,401	10,020	179,530
Sweden	2,425	3,105	27,153	28,695
Norway	5,546	2,632	59,515	50,190
Western Germany	5,576	3,195	102,288	38,396
Netherlands	8,071	4,376	148,003	93,415
Belgium	20,888	12,350	277,853	186,542
Luxembourg	15,656	5,981	170,102	94,606
France	35,630	10,269	304,431	227,289
Italy	83	4,727	9,447	36,944
Austria	39,662	27,361	227,227	420,559
Japan	4,750	—	189,391	56,639
U.S.A.	34,361	5,407	546,575	118,250
Other foreign countries	647	14	16,612	41,972
TOTAL	200,948	93,139	2,246,057	1,640,134
Iron and steel scrap and waste, fit only for the recovery of metal	56,495	56,803	649,276	789,005

Exports of Iron and Steel by Product

Product.	Month ended November 30.		Eleven months ended November 30.	
	1952.	1953.	1952.	1953.
Pig-iron	514	764	3,967	5,718
Ferro-tungsten	—	14	92	126
Other ferro-alloys	159	172	2,940	2,339
Ingots, blooms, billets, and slabs	4	411	232	1,518
Iron bars and rods	188	148	3,073	1,701
Wire rods	322	2,076	1,284	18,487
Bright steel bars	2,423	2,393	14,745	16,265
Alloy bars and rods	1,544	1,161	14,805	14,305
Other bars and rods	11,726	9,996	106,850	90,427
Angles, shapes, and sections	12,921	7,068	118,365	101,967
Iron and other castings and forgings	872	1,551	10,582	15,006
Girders, beams, joists, and pillars (rolled)	3,546	2,285	31,429	17,675
Hoop and strip	11,852	9,299	51,007	85,773
Iron plates and sheets	19	54	384	335
Tinplate	27,714	18,377	269,181	236,258
Tinned sheets	233	139	1,949	1,544
Terneplate and decorated tinplate	48	198	749	1,077
Other steel plate (⅛ in. thick and other)	24,324	19,505	219,540	209,521
Galvanized sheets	9,057	15,196	59,548	114,124
Black sheets	16,142	16,426	129,069	182,322
Other coated plates and sheets	1,057	819	10,291	8,906
Cast-iron pipes to 6 in.	7,389	6,063	79,915	73,563
Do., over 6 in. dia.	5,754	4,940	61,486	62,644
Wrought-iron tubes	39,970	34,875	391,819	403,258
Railway material	14,881	22,776	186,604	224,342
Wire	4,573	4,864	47,167	51,116
Cable and rope	3,081	2,417	28,357	27,604
Wire nails, etc.	1,201	1,537	14,819	18,210
Other nails, tacks, etc.	445	421	5,123	4,137
Rivets and washers	726	463	6,196	4,088
Wood screws	290	232	3,479	1,913
Bolts, nuts, and screws	1,699	1,808	20,604	18,058
Baths	472	469	11,033	3,891
Anchors	676	691	8,875	8,969
Chains, etc.	642	737	9,288	8,303
Springs	443	315	5,004	4,454
Holloware	9,062	15,878	83,737	104,426
Doors and windows	1,885	1,453	19,463	16,471
TOTAL, including other manufactures not listed above	243,196	234,351	2,280,213	2,407,650

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Raw Material Markets

Iron and Steel

Although deliveries of pig-iron to the foundries are on a fairly satisfactory scale, available and future supplies of some grades give cause for anxiety. The light jobbing foundries, whose demands for the high-phosphorus grades have been heavier because of the improved demand for light castings, appear to be fairly well supplied, but the low- and medium-phosphorus irons and hematite for the engineering and speciality foundries are not so plentiful. Demands for the latter grades in many cases exceed available supplies and the reported decrease in the output of the low- and medium-phosphorus irons will, it is feared, severely incommode foundries whose output of castings depends on these grades. Hematite also is barely sufficient for current needs.

Deliveries of scrap are sufficient for the requirements of the foundries, and they have no difficulty in obtaining supplies of coke, ganister, and limestone.

The re-rollers, with their present limited requirements of billets, blooms, and slabs, have no difficulty in getting supplies from home steelworks, and so far the recent reduction in the price of defectives has not stimulated much interest. Not until there is an improvement in home trade for small bars and light angles, or in export business, can the re-rollers be in a happier situation.

Sheets and plates remain in strong demand, but order-books for heavy sections and joists are being steadily reduced.

Non-ferrous Metals

Business in non-ferrous metals was rather quiet last week and nothing very startling occurred on the Metal Exchange in the way of price changes. The uncertainties attaching to the labour situation at home and the prospect of strikes in the electrical industry made operators cautious, while the prospect of an increase in freight charges on the railways did not help sentiment. Rising costs in this country are making it more and more difficult to compete on the export markets of the world and therefore it is not possible to be very optimistic about prospects in non-ferrous metals for the present year. Moreover, there is a downward movement in U.S. business activity, notably in the automobile industry, where workers are being laid off. So far employment in this country has continued at a high level, but it is impossible to play fast and loose with our economy through irresponsible strike action without damaging the trade structure as a whole. On balance last week copper lost £2 10s. for cash, but gained £1 forward, the backwardation being reduced on the week's trading from £13 10s. to £10. Some business was done by the Government broker. In zinc the backwardation widened to £1 15s. through a fall of 10s. in the forward position, January being unchanged. Lead improved by £1 both prompt and forward, while tin was erratic, closing 30s. up for cash and £1 lower for three months.

Figures of stocks and consumption for November have been issued by the British Bureau of Non-ferrous Metal Statistics. Stocks of refined and blister copper increased from 36,824 tons to 50,407 tons, while consumption of virgin copper, at 31,118 tons, showed a drop of about 1,500 tons on the October figure of 32,615 tons. Total usage, including scrap, was 42,217 tons. Consumption of zinc, all grades, was 26,982 tons—practically unchanged—while stocks of virgin, at 22,462 tons, compared with 24,731 tons. In lead the stock at November 30 was 29,174 tons, only 100 tons below the October figure. Usage of virgin and scrap, including remelted lead, amounted to 27,358 tons, which was rather lower than in the previous month. Consumption of tin was 1,541 tons, against 1,680 tons in October.

Official metal prices were as follow:—

COPPER, Standard—*Cash:* January 7, £231 to £232; January 8, £231 10s. to £232 10s.; January 11, £230 10s. to £231; January 12, £228 to £229; January 13, £227 10s. to £228 10s.

Three Months: January 7, £221 to £221 5s.; January 8, £221 15s. to £222; January 11, £221 15s. to £222; January 12, £219 10s. to £220; January 13, £219 5s. to £219 10s.

TIN, Standard—*Cash:* January 7, £660 to £662 10s.; January 8, £655 to £657 10s.; January 11, £657 10s. to £660; January 12, £652 10s. to £655; January 13, £650 to £652 10s.

Three Months: January 7, £636 to £639; January 8, £633 to £634; January 11, £632 10s. to £634; January 12, £627 10s. to £630; January 13, £627 10s. to £628.

ZINC—*January:* January 7, £74 12s. 6d. to £74 17s. 6d.; January 8, £75 to £75 5s.; January 11, £74 5s. to £74 10s.; January 12, £74 5s. to £74 10s.; January 13, £73 10s. to £73 12s. 6d.

April: January 7, £73 to £73 5s.; January 8, £73 10s. to £73 15s.; January 11, £72 10s. to £72 15s.; January 12, £72 5s. to £72 10s.; January 13, £71 17s. 6d. to £72.

LEAD—*January:* January 7, £89 15s. to £90; January 8, £90 5s. to £90 10s.; January 11, £89 15s. to £90; January 12, £89 to £89 5s.; January 13, £89 to £89 5s.

April: January 7, £88 5s. to £88 10s.; January 8, £88 10s. to £88 15s.; January 11, £88 to £88 5s.; January 12, £87 15s. to £88; January 13, £87 15s. to £88 5s.

Staveley Coal & Iron Appointment

Chairman and managing director of the Hallamshire Steel & File Company, Limited, Sheffield, Lt.-Col. J. P. HUNT has accepted an appointment as joint managing director of Staveley Coal & Iron Company, Limited, as from January 1. He has resigned his position as chairman and managing director of the Hallamshire Company, but has expressed his willingness to remain a member of the board until the future ownership of the company has been determined.

Col. Hunt joined the Hallamshire Steel & File Company on leaving Malvern College in 1923. He succeeded his father as managing director in 1934, and became chairman in 1950. Under his leadership the company was completely reorganized and re-equipped. He was Master Cutler in 1948-49 at the age of 41, being one of the youngest to hold the office, and in 1950 he was appointed chairman of the National Association for Rolled and Re-Rolled Steel Products. As Conservative-Liberal candidate, he contested the Neepsend Division of Sheffield in a by-election in 1950. A magistrate for the city of Sheffield, his other directorships include those of Johnson, Playfair & Company, Limited, steel wire manufacturers, of Sheffield, and Shipmans (Sheffield), Limited, manufacturers of steel wire and bright-drawn bars.

Col. Hunt's appointment with Staveley Coal & Iron follows the company's announcement last November that it would not be in the best interests of stockholders to reacquire its former assets, the Staveley Iron & Chemical Company, Limited, from the Iron and Steel Holding and Realization Agency. As a result, all dual executive offices have been terminated, and some reorganization made.

DAVIDSON & COMPANY, LIMITED, engineers and iron-founders, Sirocco Engineering Works, Belfast, Northern Ireland, announce that Mr. E. D. MaGuire has been appointed chairman of this Company consequent upon the retirement of Mr. Alfred A. Agar, C.B.E.